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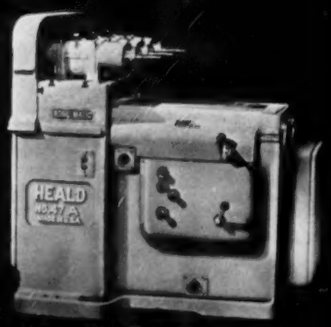

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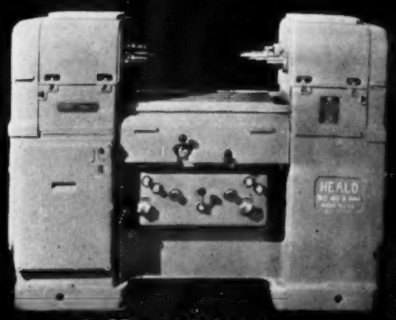

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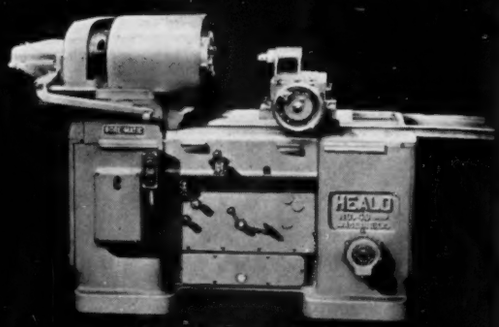

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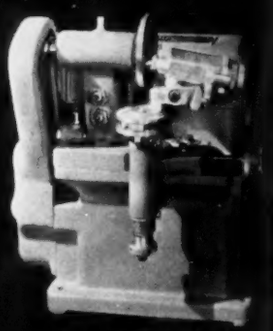

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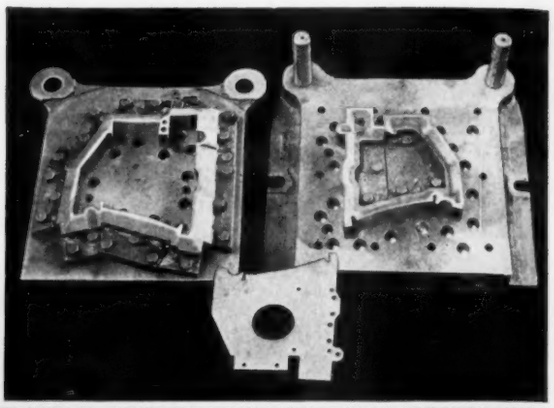

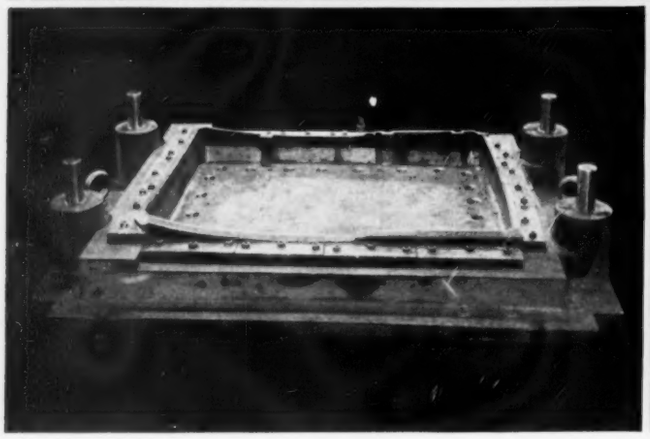

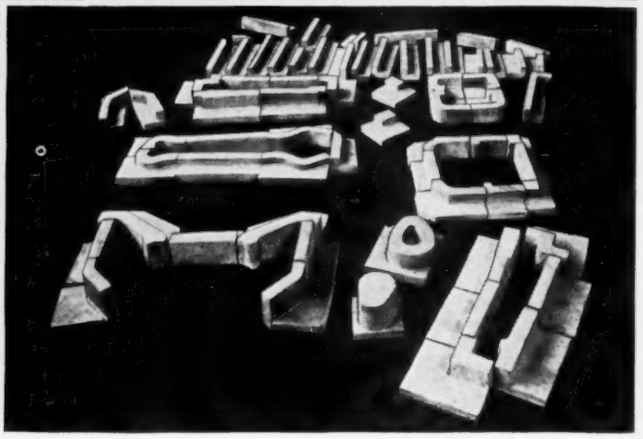

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As the Editor Views the News

PROPOSAL of Jones & Laughlin Steel Corp. to build a continuous strip mill rounds out a year of significant activity among steel producers for commanding positions in the race for flat rolled steel tonnage. The total capacity of continuous mills now operating, under construction or contemplated is staggering, but possibly no more so than the potential tonnage envisioned by some observers in the houses, automobiles, air conditioning equipment, containers, etc. of the early future. Already continuous mills have forced important changes in fabricating and manufacturing methods. No one can predict their ultimate effect upon the operations of American industry.

• • •

A Voice the Public Heeds

When business interests attack government spending, the public pays little attention. But when an organ of professional labor rebels against the "political python" of bureaucracy and extravagance, the man in the street is likely to pay heed. *The Cleveland Citizen* (p. 21), labor newspaper, has launched a campaign against "Taxing Industry Out of Business and Workers Out of Employment.". . . When William J. Filbert on Jan. 1 retires from active duty with U. S. Steel (p. 11), the industry will lose the services of one of its ablest and best informed advisers. More than many realize, he has been a tower of strength in the councils of steel.

• • •

More Power, More Steel

Several months ago in the "Business Trend" section, STEEL said that the rise in electric power consumption seemed sufficient to push the weekly output up to two billion kilowatt-hours before the end of the year. This estimate will come close (p. 22) to hitting the mark. Output already has touched 1,983,431,000, and in the succeeding week—always the peak of the year—it should equal the estimate. The unprecedented demand for electricity in 1935 means much to the metalworking industries. Part of the total reflects an increasing use of mechanical appliances in homes. This indicates an expanding market for the materials that go into refrigerators, stokers and other household machines. But also, record power output means rehabilitation and expansion of generating and distributing facilities.

• • •

Quality, Volume a Good Team

Addresses by metallurgical authorities representing two important producers of alloy steels recently served to emphasize the extent to which materials of special analysis are being employed more widely throughout industry. One speaker dealt with the functions of the alloying elements (p. 13) and the other presented numerous illustrations to show how alloy steels are helping manufacturers to improve their products. One cannot delve far into the subject of alloy steels without realizing that their development, production and application open up new, broad avenues of opportunity for the metalworking industries. As consumption expands, producers may be able to scale down prices, which in itself would help to broaden the market. A volume market for a quality product is a priceless asset.

• • •

Diversity in Profitable Ideas

The intricacy and diversity of problems embraced in treating, processing or otherwise adapting materials to their use in manufactured products are reflected in the pages of STEEL's engineering section. This week one finds, besides others, articles on heat treating (p. 24), aluminum (p. 27), welding (pp. 28, 30, 40), riveting (p. 29), brass plating (p. 31), surface treatment (p. 32), material handling (p. 34), power drives (p. 35), cutting formed strip sections (p. 37), training key men (p. 40), new equipment (p. 49). In addition, the final installment (p. 45) of the important treatise on the design of open-hearth furnaces, by William C. Buell Jr., is presented. Here is profitable information for a wide diversity of readers' requirements.

* * *

To all, a Merry Christmas!

E. L. Shaner

J & L To Diversify Output With New Continuous Mill

A CONTINUOUS wide strip-sheet mill, certainly as large as any now built and possibly of record size, is to be constructed by the Jones & Laughlin Steel Corp. in Pittsburgh in an endeavor to diversify its products and corral the increasing demand for flat-rolled steel for consumer goods.

Stockholders will be asked at a meeting, Feb. 14, to approve a $100,000,000 mortgage. Of this sum, $40,000,000 will be issued immediately, and $25,000,000 will represent the cost of the new mill.

No formal inquiry for the mill will be issued until after this meeting of stockholders, but the tentative design calls for several alternates.

May Exceed 79-Inch Width

At present, a mill of the 79-inch type just being completed by the Bethlehem Steel Co. at Buffalo, and under way at the Great Lakes Steel Corp. in Detroit, is in most favor, but it is possible that the width of sheets it will be possible for the new mill to roll will be considerably greater than 79 inches.

The site of the proposed mill is in Pittsburgh proper, at the South Side works, directly adjoining the six Soho blast furnace stacks on the east. This site, on the north side of the Monongahela river, is now occupied by an office building, structural shop, and reinforcing steel bar warehouse, all of which will be razed.

The monthly capacity of this continuous strip-sheet mill will be 60,000 gross tons of hot and cold-rolled sheets, wide strip, light plates, skelp, and also hot-rolled strip coils for the tin plate department of the Aliquippa works of Jones & Laughlin.

The mill, or rather the new plant, will comprise the following two electrically-operated divisions:

A hot rolling division consisting of a four-high-roll type of hot mill train with a full complement of heating furnaces, tables, shears, trimmers, levelers, pilers, coilers and other necessary equipment for finishing and shipping hot rolled material to the trade, to the cold rolling division, to the tin plate department and the pipe mills at Aliquippa and for other inter-plant processing.

A cold rolling division consisting of four-high-roll type of cold rolling mills set in tandem and singly, and with a full complement of finishing equipment, including picklers, heat-treating furnaces, shears, trimmers, levelers and shipping facilities.

A letter by G. M. Laughlin Jr., chairman of the board, to Jones & Laughlin stockholders, explains that the Aliquippa works, equipped to produce billets, sheet bars, structural shapes, junior beams, bars, skelp, tin plate, welded and seamless pipe, and wire products, is sufficiently diversified to insure profitable operations at the average for the entire industry.

However, the output of the present South Side works, which includes billets, hot-rolled and cold-finished bars, sheet piling, structural shapes, plates, skelp, and railroad spikes, is largely designed for the railroads and other so-called capital goods industries, which require relatively small tonnages of steel throughout the depression. As a result, this plant still cannot be operated profitably with its present line of products.

The addition of strip and sheets will enable Jones & Laughlin to participate in the production of about 75 per cent of the tonnage of steel products used in the manufacture of automobiles, instead of only 20 per per cent at present. Incidentally, the wide sheets it is proposed to roll on the new mill are in demand for one-piece automobile tops.

Once approved, the new mill will be rushed to completion, possibly turning over late in 1936. Additional employment will be afforded Pittsburgh, and increased production of coke, pig iron, and ingots will be entailed. Flotation of a $40,000,000 bond issue indicates confidence both in the money market and future requirements for steel.

In addition to approximately $25,000,000 for the new mill, including the buildings to house it, which will cover 20 acres, and auxiliary equipment, including cranes, Jones & Laughlin plans to expend $1,500,000 for additions and improvements—some already made—to the four-high cold reducing mill at Aliquippa. It also has allocated $5,000,000 for the new 44-inch electrically-driven blooming mill at the South Side works.

More Working Capital

The bookkeeping effect of these two expenditures, totaling $6,500,000, plus a reimbursement of $3,000,000 for miscellaneous capital expenditures made or shortly to be made, will be to supply it with $9,500,000 working capital.

The $25,000,000 for the mill plus $9,500,000 working capital just noted, plus $5,500,000 for retiring present bonds outstanding make up

Buick's Appetite for Steel Is a Trainload a Day

Operating on the heaviest schedules since 1929, Buick Motor Co., Flint, Mich., is increasing its consumption of steel. Already it has bought nearly 100,000 tons for 1936 cars. A trainload of steel is arriving daily at Flint during December. The photo shows a trainload being switched into the plant where it will be fabricated into crankshafts, camshafts, and other parts. Note the stock of shafts in the left foreground

the $40,000,000 for which the first mortgage will be created.

The attention of stockholders is called to the fact that Jones & Laughlin has grown entirely by expansion and has never figured in a merger. From a small beginning in 1850, it is now the fourth largest steel producing corporation, having an annual capacity of 3,660,000 tons of ingots.

Financing for the new continuous mill parallels that for the Aliquippa works. In May, 1909, a mortgage of $30,000,000 was authorized, of which $25,000,000 was issued and $5,248,000 is now outstanding. The outstanding bonds are to be redeemed as part of the new financing to be undertaken shortly.

Expect Italy To Buy Less Scrap

CARLO DI ROSA and Eugenio Garibaldi are now at the Waldorf-Astoria hotel in New York, representing a new consortium organized by Italy to buy scrap in world markets.

Opinion is growing that Italian purchases of scrap in the United States will be relatively light this coming year, both because of the attitude of the state department in Washington, which is discouraging to transactions with belligerent countries, and also the apparent policy of Italy to restrict purchases.

It is understood Italy in 1936 will curtail its steel production 30 per cent, and for this restricted production will use a greater proportion of pig iron.

Credits Precarious

Of Italian scheduled purchases of 200,000 tons of scrap in 1936, about 150,000 tons is expected to come from sources in the Mediterranean area.

While nearly 100,000 tons remains unshipped against American contracts, Italian credits here are said to be inadequate. Some contracts were entered into with interests not regularly identified with the scrap trade.

The new consortium now represented by Messrs. Di Rosa and Garibaldi has its headquarters in Milan.

In the first ten months of 1935 Italy took 518,998 tons of scrap in world markets, of which 320,965 tons originated in the United States. The heaviest month was August, when Italy imported 102,103 tons, of which 65,387 came from United States.

Stettinius Finance Head of Steel Corp. as Filbert Quits

EDWARD R. STETTINIUS JR., for the past two years vice chairman of the finance committee of the United States Steel Corp., on Jan. 1 will become chairman through the retirement of W. J. Filbert.

At 35, Mr. Stettinius, whose father, now deceased, was a partner in J. P. Morgan & Co., becomes the second in command of the Steel corporation. He is topped only by Myron C. Taylor, chairman of the board of directors.

Educated at the University of Virginia, Mr. Stettinius entered General Motors in 1924 through the Hyatt Roller Bearing Co. In 1926 he was made assistant to the vice president of General Motors Corp. in charge of the accessory division, and in 1930 became assistant to the president. In May, 1931, he was elected a vice president of General Motors, leaving April 1, 1934, to become assistant to Mr. Filbert.

A shy and aloof man, Mr. Filbert is reputed to be one of the world's greatest figure-fact men, to possess a genius for detail, to be able to make accurate analyses of situations in unbelievably short time, and to possess a knowledge of the steel industry and the Steel corporation in particular unrivaled by any living man.

W. J. Filbert

Mr. Filbert began his business career in 1881 in the purchasing department of the Chicago & North Western railroad in Chicago. In December, 1899, he became auditor and assistant treasurer of the Federal Steel Co., and when this company was merged in 1901 with others to form the Steel corporation, Mr. Filbert was appointed assistant comptroller. In June, 1902, he was made comptroller.

Since December, 1919, he has been a director of the Steel corporation and since April, 1922, a member of the finance committee. On Jan. 26, 1932, he was elected vice chairman of the finance committee, and chairman on Jan. 1, 1934. He was first secretary of the American Iron and Steel institute, of which he has been a director and treasurer, and in 1931 was honored by that body when he was awarded the Gary medal for distinguished service to it.

Edward R. Stettinius Jr.

Becoming inactive in the iron and steel industry, Mr. Filbert retires as a director of the Institute, being succeeded by Benjamin F. Fairless, who on Oct. 1 was made president of the Carnegie-Illinois Steel Corp. Mr. Filbert henceforth will be an honorary vice president of the Institute.

Last week another link with the past was severed by the Steel corporation when Percival Roberts Jr. resigned as a director. One of the original directors of the corporation, Mr. Roberts was first in the service of the Pencoyd Iron Works, became president of the A. & P. Roberts Co., which in 1900 merged with the American Bridge Co., which he also headed prior to its inclusion in the merger of 1901.

Judson To Give Foundry Exchange Paper

AMERICAN FOUNDRYMEN'S ASSOCIATION, Chicago, announces that its 1936 exchange paper for the Institute of British Foundrymen will be presented by Harold H. Judson, foundry superintendent, Goulds Pumps Inc., Seneca Falls, N. Y.

The Institute of British Foundrymen and the A.F.A., in 1921, initiated this annual exchange of papers. Originally started to present reviews on developments in foundry practice between Great Britain and the United States, this movement led to formation of an international foundry committee, composed of representatives of foundry technical associations including United States, Great Britain, France, Italy, Belgium, Germany, Czechoslovakia, and Spain. Vincent Delport, European manager of STEEL, recently was appointed vice president of the committee.

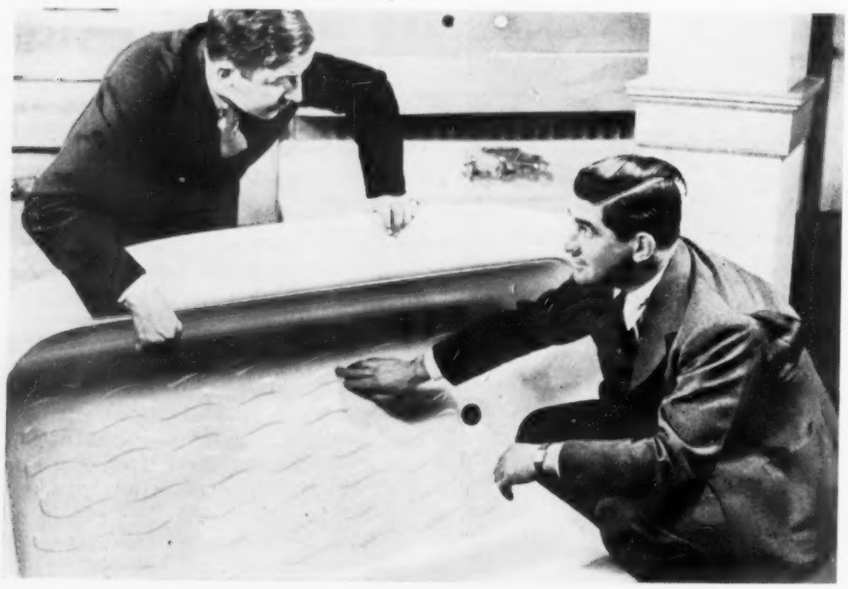
Through this committee international foundry congresses are held every three years, the last one being in Philadelphia in 1934. The next one is scheduled for Dusseldorf, Germany, in 1936.

Mr. Judson is well known for his developments in the production of high strength iron for large pressure pump castings — his paper on this subject before the 1932 convention of the A.F.A. being especially noteworthy. He also discussed shear tests for cast iron before the 1931 meeting of the American Society for Testing Materials.

Harold H. Judson

Mr. Judson, born in Holyoke, Mass., is a 1923 graduate of Worcester Polytechnic institute, receiving a degree of B.S. in mechanical engineering. Following his graduation he was for three years foundry engineer with the Riley Stoker Co., Detroit. In 1926 he entered the employ of Goulds Pumps Inc., as foundry superintendent—his present position.

Eureka! A Nonskid Bathtub, at Last!



A nonskid, streamlined bathtub may sound like a columnist's joke, but ask the person who has ever slipped! This safety tub, with sloping sides and a serpentine-embossed bottom, which gives a wave-like tread, is being made in pressed steel by the Briggs Mfg. Co., Detroit, at its Hamtramck plumbing ware division. It weighs about one third as much as a cast iron tub. John A. Callahan, general manager of the plumbing ware division of Briggs (left), is explaining the safety features to Mickey Cochrane, vice president and general manager of the Detroit Tigers baseball team

Labor

OVER 99 per cent of employes eligible to vote cast ballots in the annual election of employe representatives concluded Dec. 16 in the Weirton and Clarksburg, W. Va., plants of the Weirton Steel Co. Forty-four of the 49 posts provided under the employe plan were filled. Five representatives of the Weirton plant at Steubenville, O., will be elected in January. Of the 11,250 employes eligible to vote at Weirton and Clarksburg, 11,158 employes participated.

From June, 1933, to November, 1935, a total of 1602 cases was adjusted by these representatives, of which 74 per cent was in favor of employes, 13 per cent in favor of the company, 7 per cent compromised, and 6 withdrawn.

PITTSBURGH STEEL HEARING SET FOR JAN. 6

Hearing will be held in the new federal building, Pittsburgh, Jan. 6, before the national labor board on the right to represent some 4300 employes of Pittsburgh Steel Co. This hearing has been forced by petitions submitted by the Monessen, Pa., and Allenport, Pa., lodges of the Amalgamated Association of Iron, Steel and Tin Workers.

OHIO RIVER MILLS SPURT

In the first ten months of 1935, payrolls of the 40 iron and steel plants located in the north and south Ohio river steelmaking districts totaled $47,500,000, an increase of 28 per cent over the first ten months of 1934, and $3,250,000 more than all 1934, according to the American Iron and Steel institute. This district employes an average of 44,426 persons and has a capacity of 5,114,200 gross tons of steel ingots annually.

MUST DROP ANNUITY TRUST

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., on Jan. 1 is withdrawing its annuity trust plan for employes because of the new federal social security act. While the company will discontinue the issuance and distribution of annuity units after Jan. 1, it will continue over a period of years to make payments into the funds already initiated.

Laud Role of Alloys in Extending Service of Steel

TWO prominent metallurgists spoke on alloy steels Dec. 13 at a meeting sponsored by the American Institute of the City of New York, an organization of some 500 members interested in the general sciences. The meeting was held in the auditorium of Metal Products Exhibits, Rockefeller Center, New York.

Dr. John Johnston, director of research, United States Steel Corp., New York, spoke on "A Philosophy of Alloy Steels," and Harry W. McQuaid, metallurgist, Republic Steel Corp., Youngstown, O., reviewed "Present and Future Applications of Alloy Steels." Frederick B. Hufnagel, president of the Crucible Steel Co. of America, New York, presided.

"Steels, whether carbon or alloy, are members of a single family and owe their properties mainly to iron," said Dr. Johnston. "In fact, in alloy steels the alloying elements are added to permit better control of the properties of steel during the heat treating process. Carbon steels equal in strength, hardness and other properties to alloy steels can be produced if the processes are carefully controlled. However, it is difficult to produce carbon steels with a fully hardened structure in relatively large cross sections, whereas the addition of some of the so-called alloys permits this to be done.

Function of Alloys

"The alloying elements are restricted to those that are soluble in iron. These include silicon, manganese, nickel, cobalt, chromium, vanadium, tungsten, molybdenum and zinc, and in a somewhat different classification aluminum, sulphur and phosphorus. These alloys are added to secure definite improvement in certain properties of the finished product, especially:

"1. Improved mechanical properties at ordinary temperatures.

"2. Improved mechanical properties at high or low temperatures.

"3. Increased resistance to corrosion—oxidation or action of chemicals.

"4. Improved special properties, such as increased magnetic permeability, decreased coefficient of expansion, etc.

"Three elements decrease the rate of scaling of steel, and hence increase its resistance to corrosion. These are chromium, silicon and aluminum. The latter two elements can be added to steel in small amounts only, however, so that chromium alone is of practical value for this purpose. Nickel is often added to corrosion-resisting steels, not because it increases their resistance, but because it improves the product's mechanical properties."

Mr. McQuaid said, in part: "One of the most important factors in the development of the present-day automobile has been the use of special alloy steels in the valves, and it might be said that the development of valves having long life under the extremely difficult working conditions which exist in automotive and airplane motor service has been one of the greatest contributions of the metallurgist.

"The alloys which give the gasoline motor valve its stability at high working temperature are primarily chromium and silicon, although tungsten, nickel, molybdenum, vanadium, etc. are used to some extent. In addition to the development of the heat-resisting valve, we have the development of the inserted valve seat made from this same type of alloy.

"Alloys are added to gasoline motor cylinder blocks with considerable increase in the length of life of these important parts of the motor, and have helped to increase greatly the operating service between the shutdowns for motor block regrinding. Alloys usually added to the cylinder block to improve the life are chromium, nickel and molybdenum. Crankshafts, connecting rods, camshafts etc. are still made, as a rule, from the plain carbon types of steel; but the practice which has developed the alloy steels to their present satisfactory position has also resulted in a greatly improved carbon steel which, fortified by increased additions of manganese and some small additions of chromium etc., have been found satisfactory for many parts where the carbon steel of 20 years ago would have been unsatisfactory.

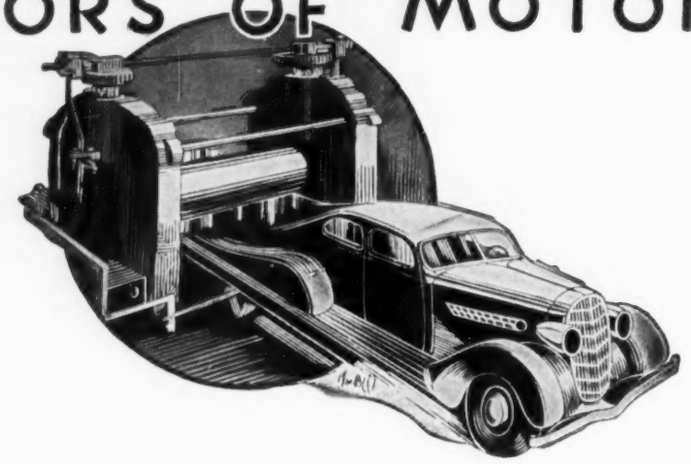
Reduce Gear Failures

"The use of alloys in gear steels has resulted in a practically negligible percentage of gear failures or rejections for noise. In axle shafts and steering gear parts, the alloy steel is practically universal except in the case of one large user who has developed a special technique of quenching with a special design which permits him to use a rather closely controlled carbon steel.

"The present heavy-duty service in trucks, busses etc. has only been made possible by co-ordination of design and alloy steels which provide not only the requisite strength required by the engineer but also the necessary ability to distribute stresses so that localized failure does not occur. The development of alloy steels combined with an improved melting practice has reduced to a minimum the losses due to axle shaft failures as well as steering gear breakage in service, with the result that in passenger automobile service, failures are almost unknown."

Speakers at a meeting devoted to "Steel Alloys, Present and Future" held under sponsorship of American institute at Metal Products Exhibits, Rockefeller Center, New York, Dec. 13. Left to right—Frederick B. Hufnagel, president, Crucible Steel Co. of America; Harry W. McQuaid, metallurgist, Republic Steel Corp.; Robert T. Pollock, chairman, finance committee, American institute; Dr. John Johnston, director of research, United States Steel Corp.

MIRRORS OF MOTORDOM



DETROIT

DOWN the stretch this week—and taking out Christmas day only—the automobile production lines here are humming. It's certain to be almost a 400,000-car month, and that for a December is well nigh a record.

By individual companies, there is no evidence of a slackening, for the output of each is holding close to the fast pace that was set in October. New cars for Christmas presents this year will be a big item in expanding retail trade.

Therefore, many is the production superintendent here who comes down to work in the morning to find his desk a profusion of telegrams. They are from dealers asking for delivery promises on new cars.

But, seemingly with intent not to lift production much over 100,000 cars weekly, the industry would rather hold a level keel and accumulate a moderate backlog. It's good insurance. Taken all in all, it's a sane way of looking at a new year's problem.

Will Not Rush Production

Take for example, Chevrolet. This interest can run off better than 100,000 jobs a month, but, with orders in hand for more than that number, it prefers to set a January goal of another 100,000, the same as it made in November and will have made in December.

At Ford and Plymouth, it is pretty much the same story. Each has a comfortable cushion to lean against for at least the next month. January looks promising. But after that, well-posted observers split wide apart into two camps.

One group says that barring election year, barring bad weather and barring all uncertainties—in fact, in spite of high water and its counterpart—we are in for a whopping good 1936 in the automobile industry. In short, nothing can stop a year good for at least 5,000,000 cars.

The other belief, also very evident in Detroit today, says, "Wait a minute. Here we've had a pretty good fall and early winter in this business. It's reasonable to expect a bill will come through, paying for this. We seem to be mortgaging spring buying, and that will cause an about-face along in February. Furthermore, the used car problem is going to be a big brake."

To analyze those last words, it is true that we do not usually have 400,000-car months in November and December. And it also is true that the used car situation is perhaps at its worst in some time.

Dealer Capital Frozen

Since the "little code book" went out, dealers have been giving allowances all over the lot for trade-ins. But, on their purchases of new cars from the factory, the dealers still have to pay on a sight-draft-bill-of-lading basis. Evidently, considerable dealer working capital is tied up in those hand-me-downs you see out on the lots.

This is because October, November, and December sales of new cars were heaviest in recent history. Virtually every one that went out brought in a white elephant in the form of a trade-in. As an aftermath, the ratio of used to new car sales is far below normal.

Furthermore, the nondescript files of once-shiny models don't look as though they'll be thinned out in a hurry. January, February, and March are notoriously poor used-car selling months.

So that's the plight many dealers find themselves in. The hurry-up call has gone out in some cases, and while the parent factory may be harsh, it isn't altogether a Simon Legree, for factories are now lending a hand.

The motor plants are coming to realize the need of a flourishing dealer organization, and some have seen the light—that to sell new cars, one must move old cars. Chevrolet and Hudson have taken a front seat in the work of cleaning out their dealers' lots of models of ancient vintage.

Chevrolet a few months ago started the "red tag" idea. This was a "bill of health" signed by the factory on a used car. But to drive the point home, shortly after the first of the year a group of Chevrolet higher-ups will start an extensive tour of the country, to do nothing but tackle the used model situation.

Some idea of Chevrolet's success lies in 111,450 used car sales by its dealers in November; the best previous November sale of used cars was 94,513 in 1929.

Incidentally, in that same month Chevrolet sold 91,959 new cars, against a best-previous-November-mark of 64,973 in 1926.

Hudson hits the trouble from another angle. Every time reports from the field indicate a Hudson dealer is close to getting stuck, the order goes out for every salesman at that particular branch to turn over all his time to used cars until the ratio is righted. New car sales for the time being are entirely neglected, that is except those that come in "over the transom."

Scrapping Is Best Relief

Of course the most convincing and final way to ring down the curtain on the used car bugaboo would be for each motor car manufacturer to have an open-hearth furnace. Then, like Ford used to do, they could jointly assume the responsibility of buying up wrecks, or near-wrecks, and obliterating them.

Theoretically, then, each new car maker could embark on a program of buying up, say all old cars over eight to ten years of age, putting them in the press, and feeding them into the furnace. With each melt

down would be a new car sale opening up.

One reason why Ford discontinued its energetic solicitation of old wrecks for remelting was that it found it was doing too much missionary work for competitors. Presumably, therefore, the solution lies only in a concerted program under sponsorship of the entire industry.

Of course it is true that there are buying agencies in many of the large cities which specialize in buying up old cars and retiring them for their salvable parts. The scrap trade also junks and sorts old cars, and the product ultimately finds its way to some open-hearth furnace.

But to round up old automobiles for scrapping, a Michigan inventor recently perfected the idea of a portable baler, which, while substantially constructed, is carried around the countryside, set up in an auto graveyard, and put to work preparing the scrap for the market.

Designers a Year Ahead

So, to return to the ominous used car problem, casting its shadow on new car production for February and March. This more than any other should be a tempering factor entering into a conservative opinion of motordom's production over the next 90 days.

In the meantime, back of all this holly, tinsel and year-end effusion, a lot of news is being bottled up in Detroit right now. It is jealously guarded in the automobile design and drafting rooms.

Out in the General Motors building, Fisher Body has completed clay models of all of the General Motors' bodies for 1937. Pencil sketches long since have given away to blueprints. In another General Motors division—this one guarding the purse-strings—there are plans to spend a considerable sum in many subsidiary divisions on 1937 retooling.

For instance, Fisher Body by last week had received a multitude of bids on its 1937 tool program, had placed the business, and had even gone so far to specify that deliveries on machine tools and other equipment bought could be made immediately after Feb. 1. Practically all of this is new machinery.

Fisher's expenditures will run into seven figures, at least. What the entire General Motors' expenditures will run to is anyone's guess; it's a little too early to say. Not only did some divisions like Chevrolet complete a big overhauling in 1935 such as at Saginaw, Baltimore, Indianapolis, and many other cities and therefore won't repeat in 1936, but many General Motors parts divisions have not yet formulated what definite changes they will want in plant equipment.

Ford, too, was in step with preparations for 1937 models. Last week a number of changes were in the wind for Rouge, among which were machine tool purchases being made that can definitely indicate nothing other than an all-steel top for the V-8 in its next year's series.

It looks, as this department has said on numerous occasions, as though 1937 will be a big retooling year, retooling based both on normal replacements and based on motor, body, and other mechanical changes. The 1936 jobs were put out with a minimum of retooling.

Ask Bids on Used Tools

Today, after some four years' promise, Dodge seems set on an extensive expenditure, probably to take form some time very soon after the turn of the year. Packard is another good bet, but of course most of Packard's retooling will be for the small six, when, as, and if, the decision is reached to manufacture it.

Speaking of this latter, Packard took bids from numerous machinery and equipment firms, enough to pile up at least ten lots of four and five-foot stacks of papers, each solidly composed with cost estimates. When this was all finished—about a month ago—the management went into a huddle and decided to ask for alternate bids on a used-machinery basis. The net result has been a costly lot of figuring and not a penny's worth of equipment contracted for yet, either new or used.

Incidentally, someone has figured out that Packard normally uses 2765 rolls of blueprint a year, or enough to make a yard-wide strip, 152 miles long.

Packard still keeps the plant doors closed to lookers-in, and it is all of a month now that a good many secret rearrangements have been going on inside the Packard plant. For one thing, Packard is putting in a system of "switch assembly lines", which are nothing more than short spurs off the main line. Their function is to take care of a job when some delay occurs. Rather than hold up the whole line, the troublesome job is lifted off, out and onto the switch.

Last week Packard clicked off around 1500 jobs, which is 300 a day, five days. Getting over 300 daily seems to be a difficulty at Packard. At all events, its tentative January schedule is some 7000.

Production Statistics

Hudson last week, with two lines going, made 725 jobs per day, five days. Following a 13,010-car November, this month just closing will add up to 14,000. Hudson thereby will make 34,000 cars in the last quarter, virtually a record, and additionally will go into Jan. 1, 1936, with at least 6000 jobs on order.

Even as recently as Dec. 15, Hudson expected to make 33,500 cars for the last quarter by scheduling 13,500 in December, but a week ago an additional 500 were projected for assembly before Jan. 1.

Chrysler last week released on parts for 5500 Airflow and Airstream jobs, to be ready for late January and February assembly. Of that number, 3500 sets were for Airflows, 2000 for the Airstreams. This represents one of the first sizable lot Chrysler has released for its 1936 jobs.

At Plymouth, assemblies hold close to 2200 daily, five days, or 11,000 weekly, and Dodge has been consistently making as high as 1400 finished motors daily, with completed cars at the latter Chrysler Corp. division being on a 7000 per week basis.

Studebaker, at South Bend, appears to be above the pay-point. Not so long ago it explained that after a 5000-unit November, if assemblies for December bettered the 6500-car mark, the company would begin to break even. Last week Studebaker was making around 2000 cars, or at the rate of 8000 monthly.

Buick, Olds, and Pontiac were three standbys last week, each making between 4000 and 4400 jobs for the five days. Pontiac's foundry is reopening slowly after three years' shutdown.

The two leaders, Chevrolet and Ford, appear to have reversed positions as against a year ago. Chevrolet, with a good start on 1936 models, has been making better than 25,000 weekly; Ford has been around 22,000 jobs per week.

Automobile Production

Passenger Cars and Trucks—U. S. Only
By Department of Commerce

	1933	1934	1935
Jan.	128,825	155,666	292,817
Feb.	105,447	230,256	335,700
Mar.	115,272	338,434	429,834
Apr.	176,432	352,975	477,746
May	214,411	330,455	364,727
June	249,727	306,477	361,321
July	229,357	264,933	337,044
Aug.	232,855	234,811	240,051
Sept.	191,800	170,007	89,805
Oct.	134,683	131,991	275,021
Nov.	60,683	83,482	*380,000
11 mo.	1,839,492	2,599,487	3,584,066
Dec.	80,565	153,624	.....
Year	1,920,057	2,753,111	.....

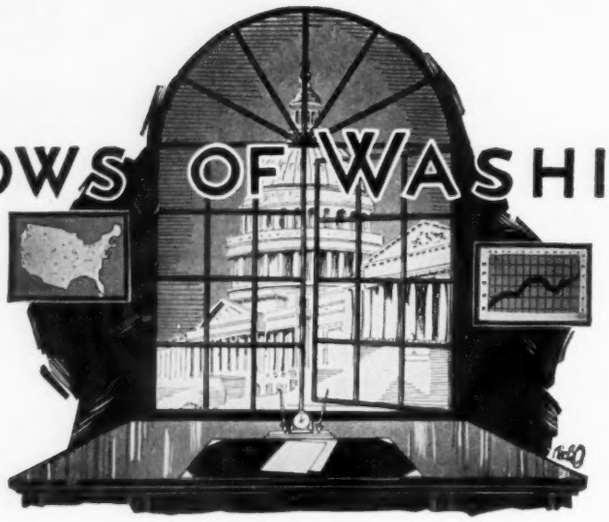
*Estimated.

Estimated by *Cram's Reports*

Week ended:

Nov. 30	83,358
Dec. 7	93,180
Dec. 14	98,582
Dec. 21	103,600

WINDOWS OF WASHINGTON



WASHINGTON

HAVING fallen down on his industrial-labor conference on Dec. 9, Maj. George L. Berry is trying high pressure salesmen methods in trying to line up some of the big men of industry to attend his so-called industrial council meeting which, after several postponements, he has now scheduled for Jan. 6.

It cannot be said, however, that Major Berry cannot "take it." Despite the emphatic turndowns which he received from the steel, automobile, lumber, and other industries in response to invitations to his conference Dec. 9, he has forgiven all. Last week he again issued letters to these industries—a sort of "last chance" bid.

In connection with efforts to try to coerce business men to sit at the forthcoming council meeting, Major Berry's office denies that any such thing is being done. On the other hand, at a round table conference last week between trade association executives and Washington representatives of business papers, one of the leading trade association secretaries stated definitely that such efforts had been made in his industry.

Berry Staff Slashed

The whole Berry fiasco is being taken in a light vein now—especially in view of the fact that 24 persons who had been assigned to assist Major Berry at the conference have been withdrawn in the general exodus that is to take place from NRA on Jan. 1, when 1200 of the present 2200 employes will leave on orders from headquarters. The fact that Major Berry will lose these helpers is significant in view of the fact that these dismissals have the personal approval of the President.

L. J. Martin, who has been rather an inactive head of NRA for some months, or since the advent of Major Berry, leaves on Jan. 1. He made up this list of 1200 dismissals but insisted that they have the approval of the White House. It is reported that the major is very "sore" at losing these helpers.

There are various corridor whispers these days regarding NRA. The President, however, on Friday disposed of most of them when he said that in three or four days he would be ready with a definite announcement. While details have not been worked out, he expects the remnant of NRA will be divided between two or three departments. The President was definite that it would not go in entirety to the federal trade commission. The three departments expected to get part of NRA are labor, commerce, and agriculture.

Major Still in the Picture

This statement seemed to scotch the report that NRA might be turned over to Assistant Secretary of Commerce Draper. Apparently, Major Berry will figure somewhere in the scheme, for the President said the reorganization would fit into the Berry situation.

There is a very definite belief that new dealers feel that the major has made a mess of things. It may have been a trial balloon for the administration just to see what business and industry would do, and if it was, the administration found out in no uncertain terms.

While on the subject of NRA it may be recalled that that organization has been more or less held together to make surveys or studies of various industries, including steel. Due to dismissals and one thing or another the progress on these reports, which were to have been officially made to the President on Dec. 1, has been seriously delayed.

However, on Tuesday of last week a progress report on these surveys is said to have been made to the President by Dr. Leon Marshall, in direct charge of this work. As to the steel report, there was little to say other than to outline what NRA hoped to have in its report. This was done.

A. G. White, now in charge of the NRA steel report, believes that it will be the middle or last of January before even a preliminary report can be made on steel, and it will be March 15 or later before the final report is ready. This means, inasmuch as NRA dies on April 1 unless again continued by law, that the steel study will be one of the last to be made.

At best, the general feeling here is that these reports will go to the new archives building of the government or, perhaps, will be filed in waste baskets of the government. The work on the steel report was seriously held up when R. W. Shannon left NRA for private business.

No Agreements Operative

After all of the fuss that was made over voluntary trade agreements after NRA was declared unconstitutional, it is interesting to know that only nine industries—and these mostly not important ones—asked for such agreements. Incidentally, up to the time of this writing none of these agreements has been finally signed and become operative, and this in spite of the fact that they have been months in the making. Of course, these must not be confused with the regular trade practice conferences. The federal trade commission has requests for any number of the latter.

In connection with the nine voluntary agreements, none of which is related to steel, it is reported that the fertilizer industry has gone into the matter with great seriousness and has analyzed all of the laws that might affect such an agreement. Some of the plans that have been presented are reported to be very slipshod, but that cannot be said for the fertilizer crowd. Their agreement

includes price and shipping reporting.

In connection with the fertilizer agreement, it is reported on the best authority that in asking for this agreement this industry did not take into consideration any supposed promise by the President to get out of any of the machinations of the antitrust law. The agreement was asked in spite of this alleged exemption and not because of it.

In these agreements it is said that the commission is taking the stand that it "wants to be constructive but it must be safe." That, at least, is the feeling of some of its prominent members.

ICKES GIVES NEW DEAL CREDIT FOR STEEL EXPANSION

Secretary Ickes is not through with the steel industry yet. At a press conference last week it was quite apparent that a question had been planted, because when one of the correspondents asked about the matter, strangely enough, the secretary had all of the information written and at hand. This is not the first time that has happened with the secretary of the interior. He is evidently taking lessons from the White House.

Mr. Ickes said that the steel industry would not be talking of expanding today if it were not for the PWA and WPA contracts. The recent revival of business in the steel industry and the expansion of the steel plants and equipment are due, for the most part, to stimulus which has been given to the industry by the government, he stated.

"PWA has spent $260,000,000 in the last few years for finished steel and this is inclusive of what contractors have spent for new machinery," Mr. Ickes said. He stated further that PWA has created more than 400,000,000 man hours of labor in the steel industry during the past couple years and pointed out that this is equivalent to ten 40-hour weeks of work for a million men.

Mr. Ickes came to talk on the subject when he was questioned by one of the newsmen on the Jones & Laughlin announcement that it would spend $40,000,000 for plant expansion.

In connection with public works, President Roosevelt announced last week that he will ask congress for an appropriation of half a billion dollars with which to complete projects which are already under way. He refused to say whether he would ask for money for any other works, but indicated clearly that this half billion would be earmarked for certain projects—that is, for their completion.

HAND TOOL DUTY IS PEGGED

In connection with the trade agreement entered into last week between the United States and Honduras in the case of hand tools, a favorable duty is to be bound against increase. Considered as a group, these several tools represented exports valued at $94,000 in 1929 and $75,000 in 1934.

GOVT. STEEL MUST NOW BE MADE FROM GUFFEY COAL

Washington representatives of steel interests are expressing some concern over action taken by the procurement division of the treasury department in notifying heads of all government departments and establishments to insert the following provision in each contract made hereafter "with a contractor for any public work or service."

The insertion suggested is as follows:

"In accordance with the provisions of section 14(b) of the bituminou. coal conservation act of 1935 the contractor agrees that he will buy no bituminous coal to use on or in the carrying out of this contract from any producer except such producer be a member of the bituminous coal code set out in accordance with section 4 of said act as certified to by the national bituminous coal commission."

Section 14(b) of that act provides:

"Each contract made by the United States, or any department or agency thereof, with a contractor for any public work, or service, shall contain a provision that the contractor will buy no bituminous coal to use on or in carrying out of such contract from any producer except such producer be a member of the code set out in section 4 of this act as certified to by the national bituminous coal commission."

While no actual construction has yet been placed on this by the government, it is generally believed that it will cover the purchase of iron and steel and all supplies for the government.

FEDERAL PAYROLL TAX REGULATIONS OUT SHORTLY

The bureau of internal revenue will make available between now and Jan. 1 preliminary regulations relating to the federal payroll tax that begins to accrue next year. It is provided by the social security law for the imposition of two different payroll taxes on employers, and, in addition, an earnings' tax on employes.

Persons employing eight or more employes, excluding those engaged in exempted occupations, will be taxed in 1936. For 1936 only the tax rate is 1 per cent of total payrolls, including all remuneration received by officers and nonexempt employes.

Employes in states with unemployment benefit laws that are found by the social security board to conform to standards set forth in the act will be entitled to receive credit, against the federal tax, for all or a substantial part of their contributions made under the state system. The federal tax is to be payable upon returns which do not have to be made until Jan. 31, 1937.

The other federal payroll tax does not begin to accrue until Jan. 1, 1937. This tax, like the tax on employes' earnings which also first accrues in 1937, is to be based upon only the first $3000 of each employe's annual remuneration. As these two taxes will not be payable for more than a year, regulations respecting methods for computation and collection will probably not be made public for some time.

Died:

GEORGE W. KNAPP, 88, a director of the National Enameling & Stamping Co., Milwaukee, and the inventor of various processes of manufacturing used in the metal stamping industry, at his home in Baltimore, Dec. 18.

◆ ◆ ◆

Maurice Wolfe, founder, president and general manager of Meteor Motor Car Co., Piqua, O., in that city Dec. 19.

◆ ◆ ◆

William A. Rightmire, 69, until his retirement ten years ago engineer for the American Steel & Wire Co., Cleveland, in that city Dec. 17.

◆ ◆ ◆

Clyde E. Houk, 53, production development engineer, Osborn Mfg. Co., Cleveland, in Lakewood, O., Dec. 13. He had been associated with the Osborn company for more than 20 years.

◆ ◆ ◆

Amos V. Ellis, 65, sales manager of the American Stove Co. in the Cleveland district, in that city recently. He became associated with he Schneider & Trenkamp Stove Co. 35 years ago, this firm later merging with American Stove.

◆ ◆ ◆

Joel O. Cheek, 83, Nashville, Tenn., vice president of the Farrell Cheek Steel Foundry Co., Sandusky, O., in Jacksonville, Fla. A founder of the Cheek Neal Coffee Co., Nashville, he was also originator of the Maxwell House Showboat radio program. He was a summer visitor to Sandusky and became interested in the steel foundry business there.

◆ ◆ ◆

Walter Leighton Clark, 76, president, Grand Central Art Galleries, New York, in Stockbridge, Mass., Dec. 18. Previous to his forming the art galleries, he was vice president of the Niles-Bement-Pond Co., New York, manufacturer of machine tools and other equipment for 25 years. He retired from this post when he was a little more than 50 years old. He was a member of the American Society of Mechanical Engineers and the Engineers' club.

Production

STEELMAKING last week eased 2½ points to 52 per cent, and expectations are for a further slight decrease this week, owing to possible shutdowns over the holidays. However, due to the fact that most shutdowns are to be for Christmas day only, combined with heavier melting schedules at Youngstown, this decline may be softened somewhat. Districts to register losses were Youngstown, Pittsburgh, Cleveland, eastern Pennsylvania and Detroit, those reporting gains were Buffalo, Chicago and New England, while the remaining districts held steady. Further details follow:

Youngstown—Dropped 6 points to 56 per cent last week, with indications of a 3-point rise to 59 per cent at this week's start, due to stronger schedules for Sharon Steel Hoop Co. and Carnegie-Illinois Steel Corp.

New England—Up 1 point to 83 per cent, with no material decline indicated during this week.

Pittsburgh—Off 2 points to 40 per cent last week. In spite of this decline, mills are running at the best late December rate in six years. According to plans late last week, the observation of Christmas, usually attended by a widespread shutdown of a week or more, will not occur this year. Most mills will take off the day of Dec. 25 only, although week after next several producers plan to shut down for necessary repairs.

Twenty-seven out of 60 steelworks blast furnaces are on. Jones & Laughlin Steel Corp. banked one of its Eliza stacks, otherwise rates of individual producers held unchanged.

Wheeling—Steady through last week at 78 per cent, as 29 out of 37 open-hearth furnaces continue to operate. For this week, with Dec. 25 being observed by shutdowns, the rate of operations probably will decline to an average of 60-65 per cent.

Detroit—Off 6 points to 88 per cent, with one less open-hearth furnace operating through last week. As of late last week there were 15 out of 17 open hearths on schedule.

Cleveland-Lorain—Down 2 points to 82 per cent, Republic Steel Corp. taking off 1 open hearth to operate 13, Otis Steel Co. continuing with 8, and National Tube Co. with 11. Republic and Otis will suspend open hearths only for Christmas, but National Tube will be down all this week, and the operating average in this district will be about 45 per cent.

Birmingham—Steady operation of 12 open hearth furnaces has held the steelmaking rate at 56 per cent. There has not been much accumulation of ingot. The schedule for this week will be disturbed by one or two days. Prospects for the first quarter are bright.

Chicago—Averaged 60 to 61 per cent, closing the week at the lower figure. A decrease is scheduled for this week, with the recession likely to be as much as 5 points, since one mill plans to start a repair program which necessitates the closing of a number of open-hearth furnaces. Blast furnace operations are unchanged, 14 of 61 stacks being active.

Buffalo—Gained 3 points to 50 per cent last week, with 19 open hearths in production. Belief is expressed that January operations will exceed 50 per cent.

Central eastern seaboard—Down 1½ points to 35½ per cent, with expectations of a more pronounced letdown this week and next as a result of the holiday. A sharp resumption shortly after the turn of the year is expected.

Steelmaking Operations

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended Dec. 21	Change	Same week 1934	Same week 1933
Pittsburgh	40	— 2	26	29
Chicago	60½	+ 1½	36½	40
Eastern Pa.	35½	— 1½	22	26
Youngstown	56	— 6	41	39
Wheeling	78	none	80	51
Cleveland	82	— 2	64	57
Buffalo	50	+ 3	37	38
Birmingham	56	none	30	52
New England	83	+ 1	50	72
Detroit	88	— 6	59	52
Average	52	— 2½	37½	38

Steel Safeguards Bird Skins Against Deterioration

IN THE new Whitney Wing of the American Museum of Natural History, New York, 2100 steel cases have been installed for the storing of 650,000 bird skins, including the famous Rothschild collection which was presented to the museum in memory of Harry Payne Whitney, by his family.

The cases were made by the Art Metal Construction Co., Jamestown, N. Y., and are of arc-welded construction throughout. As a further means of guarding these valuable skins against deterioration, a special sponge rubber gasket, supplied by the B. F. Goodrich Co., Akron, O., is installed around the door jamb of each case to provide an air-tight and moisture-proof seal.

If these 2100 cases were placed side by side they would form a line two miles long. They contain 52,600 drawers which, if piled one upon another, would reach a height three times the Empire State building.

SHEET ACTIVITY IMPROVES

Sheet sales for November reported by the National Association of Flat Rolled Steel Manufacturers, Pittsburgh, increased to a daily average of 9636 net tons from 7297 tons in October. Production rose from 7192 tons to 7484 tons in November, while shipments were practically unchanged, 7114 tons in October, and 7115 tons in November. Totals for November: Sales 289,101 tons; production 224,541 tons; shipments 213,453 tons. Total sheet capacity in the United States for November was approximately 500,000 tons, and the capacity on which the association's figures are based was 303,000 tons.

Industrial Men in the News

H. E. Field, Vice President, Continental Roll & Steel Foundry Co.

He returns to company he served as vice president and treasurer when it was formed early in 1930.

For 40 years he has been identified with production and sale of iron and steel rolls and castings.

He has held a number of high executive posts in his previous associations.

H. E. FIELD, for the past five years vice president of Mackintosh-Hemphill Co., Pittsburgh, has resigned to become vice president of Continental Roll & Steel Foundry Co. He will have his headquarters in Pittsburgh.

Mr. Field has been identified with the production and sale of iron and steel rolls and castings since his graduation from Worcester Polytechnic institute in 1895. For four years he was assistant to the superintendent of the Builders Foundry Co., Providence, R. I., and later, for a like period served as metallurgist of the Farrel Foundry & Machine Co., Ansonia, Conn. He went to Pittsburgh in 1904 to become superintendent of foundries for the Mackintosh-Hemphill Co., and continued this affiliation until 1914, when he became president of Wheeling Mold & Foundry Co., Wheeling, W. Va.

When the Wheeling company, the Duquesne Steel Foundry Co., and the Hubbard Steel Foundry Co. merged to form the Continental Roll & Steel Foundry Co., Mr. Field was elected vice president and treasurer. He remained here until October and then became manager of roll sales for Mesta Machine Co., Pittsburgh. In January, 1931, Mr. Field left Mesta to become vice president of Mackintosh-Hemphill Co., which company he is now leaving.

He is a past president of the Pittsburgh Foundrymen's association and a past vice president of the American Foundrymen's association.

♦ ♦ ♦

B. H. Whiting has been appointed district manager in Cincinnati for the Whiting Corp., Harvey, Ill. Mr. Whiting will handle sales of all the company's lines, including electric traveling cranes, foundry equipment, railroad specialties, pulverizers, and combustion equipment.

♦ ♦ ♦

Sherrod E. Skinner has been made general manager of the Ternstedt Mfg. Co., Detroit, division of General Motors Corp. Previously he had been assistant general manager.

♦ ♦ ♦

E. S. Chapman, former president of the Amplex division of Chrysler Corp., Detroit, has been appointed general works manager of Plymouth Motor Corp., also a Chrysler subsidiary.

♦ ♦ ♦

William H. Walker has joined the Milwaukee warehousing plant of Joseph T. Ryerson & Son Inc. as manager of the reinforcing bar steel department, serving Wisconsin and upper Michigan.

♦ ♦ ♦

Ransome T. Lewis, formerly general manager of the American Bridge Co. plant at Elmira Heights, N. Y., has been named president of the Elmira Precision Tool Corp., recently organized. The firm is occupying the former Willys-Morrow Co. plant.

♦ ♦ ♦

G. G. Van Tuyl, 18927 Winslow road, Cleveland, has been appointed representative in the Cleveland district for the Pennsylvania Pump & Compressor Co., Easton, Pa.

♦ ♦ ♦

W. Elzey Brown, sales promotion manager, tractor division, Allis-Chalmers Mfg Co., Milwaukee, has resigned, effective Dec. 1. He joined the Allis-Chalmers company in 1930, having previously been associated with the Muskogee Iron Works, maker of tractor parts.

♦ ♦ ♦

C. N. White, foundry superintendent of Kelsey-Hayes Wheel Co., Detroit, has resigned.

♦ ♦ ♦

C. L. Rice, vice president and manager of the Hawthorne works, Chicago, of the Western Electric Co., has been nominated for president of the Chicago association of commerce.

♦ ♦ ♦

George R. Fink, president, National Steel Corp., Pittsburgh, has been elected a director of National Investors' Corp., New York, to fill a vacancy.

♦ ♦ ♦

Henry T. Lathrop, identified with the Detroit office of Pickands-Mather & Co., Cleveland, will sever his connection with the company effective Jan. 1 to become associated with the Electronic Control Corp., East Grand boulevard, Detroit.

Jesse J. Booth

Who has been appointed assistant chief maintenance engineer at the Duquesne works of the Carnegie-Illinois Steel Corp., as noted in STEEL for Dec. 16

♦ ♦ ♦

James K. Sutherland, formerly superintendent of the blooming mills of the Youngstown Sheet & Tube Co., Youngstown, O., has been appointed superintendent of rolling mills, including the blooming, hot strip and skelp mills, succeeding John Vohr, who has resigned to become superintendent of the new wide hot strip mill being constructed by the Granite City Steel Co., Granite City, Ill.

Jonathan Ingersoll, assistant su-

perintendent of the blooming mill, now becomes superintendent of that department and of the skelp mills.

A. S. Glossbrenner was named superintendent of the hot strip mills, of which he was formerly assistant; George Paul, mechanical turn foreman, was named assistant superintendent of the hot strip mill, and F. W. Hawkins has been made assistant superintendent of the blooming and skelp mills.

♦ ♦ ♦

Wood Sanford, Chicago, has been appointed advertising manager of the Harnischfeger Corp., Milwaukee. He was associated with the Sullivan Machinery Co., Chicago, for 13 years in a similar capacity. Mr. Sanford replaces Jay O. Ferch, now with Globe-Union Mfg. Co., Milwaukee.

♦ ♦ ♦

Charles L. Hyland, 11 West Monument avenue, Dayton, O., has been appointed sales representative in the Springfield, Dayton, and Cincinnati territory, by the cold-drawn bar division of the Western Automatic Machine Screw Co., Elyria, O., to handle sales of cold-finished bar steel in carbon and alloy grades, as well as carbon and alloy wire.

♦ ♦ ♦

Maj. Gen. George E. Leach, former mayor of Minneapolis and for the past four years chief of the national guard bureau, Washington, has returned to Minneapolis as a manufacturer, operating the Marquette Mfg. Co., manufacturer of automobile and garage accessories and equipment.

♦ ♦ ♦

Lemuel R. Boulware, formerly general sales manager of the Easy Washing Machine Co., Syracuse, N. Y., has been elected director, vice president and general manager of the Carrier Engineering Corp., Newark, N. J., air conditioning manufacturer. He will assume his new duties Jan. 1.

♦ ♦ ♦

J. M. Highducheck, formerly supervisor of cutting tools and applications for the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed district manager of the midwestern territory for American Cutting Alloys Inc., New York. He is one of the pioneers in the use and application of cemented carbide hard metal, and is the author of many interesting papers on the subject.

♦ ♦ ♦

T. T. Johnson has been appointed sales metallurgist for the Republic Steel Corp., pig iron division. He will be attached to the Birmingham, Ala., district of Republic.

After completing a specialized education in industrial chemistry, Mr. Johnson became associated with the United States Pipe & Foundry Co. as chemist at the Bessemer, Ala., works. From 1909 to 1920 he was chief chemist and had active charge of cupolas and melting.

From 1920 to 1921 he was assistant general superintendent, and in the latter year was made general superintendent. He continued in that capacity until his recent appointment. In 1918, he was transferred to the Chattanooga, Tenn., and Burlington, N. J., works of United States Pipe & Foundry Co., doing experimental work in the manufacture of cast iron shells for the government.

♦ ♦ ♦

C. G. Cunningham, formerly manager of the Pittsburgh office of Pratt & Whitney Co., for several years, has been transferred to the managership of the Chicago office, to fill the vacancy caused by the death of William Hunter.

William H. Hull has been named manager of the Pitisburgh office, succeeding Mr. Cunningham. Mr. Hull is a graduate in mechanical engineering from Northwestern university. For several years he was associated in engineering work with the General Motors Corp. and, until recently, was general manager of the eastern plant of the Expanded Metal Co., Jeannette, Pa.

Robert F. Sanner

Who as noted in STEEL for Dec. 16 has been appointed superintendent of personnel at the Duquesne works of the Carnegie-Illinois Steel Corp.

♦ ♦ ♦

Harry Cohen, H. Cohen & Co., Chelsea, Mass., was elected president of the Boston chapter of the Institute of Scrap Iron and Steel Inc., at the annual meeting held at Hotel Lenox, Boston, Dec. 12. Other officers elected include: David Barowsky, of Jacob Barowsky, Fitchburg, Mass., vice president; Simon Edinburg, Edinburg Metal Co., Worcester, Mass., treasurer; Arthur T. Ahern, Auburndale, Mass., secretary, and J. Lipsitz, J. Lipsitz Iron Co., Chelsea, chairman of executive committee.

Activities of Steel Users and Makers

INLAND Steel Co., Chicago, has announced a new steel—Hi-Steel. It is of the so-called low-alloy, high-tensile strength class. The minimum yield point is 60,000 pounds per square inch for gages lighter than ¼-inch and 55,000 pounds in heavy gages. Minimum ultimate tensile strength is 70,000 pounds per square inch, giving it a high elastic ratio. The elements used give this alloy a high degree of uniformity and physical characteristics as well as workability. Tests extending over a year's time show that it will bend, form, stamp, seam, and weld readily. It is highly resistant to corrosion. It will be supplied as sheets, strip, plates, bars, and structurals.

♦ ♦ ♦

Macwhyte Co., Kenosha, Wis., has received a repeat order from the Benquit Mining Co., Manila, P. I., for 400,000 pounds of heavy wire rope, requiring ten freight cars for rail transportation to the Pacific coast. An order of similar size was delivered six months ago to the same interest.

♦ ♦ ♦

Salem Engineering Co., Salem, O., is removing the offices and works of its subsidiary company, the Salem Engineering Co. of Canada, from Toronto, Ont., to Welland, Ont., where it has acquired manufacturing facilities, and will carry on the manufacture of a full line of electrically-heated and fuel-fired industrial furnaces. A. T. Greiner is resident manager.

♦ ♦ ♦

Crane Co., Chicago, has established a division of research and development to supervise work formerly handled by various departments and subsidiaries. These are being expanded and centralized to form the new division. M. W. Link has been appointed director of the division. A new product engineering department, headed by C. A. Dopp, product engineer, also has been created and will be in close association with the division of research.

♦ ♦ ♦

Air Hygiene Foundation of America Inc. has been formed, by a group representing various industries, with headquarters at Thackeray avenue and O'Hara street, Pittsburgh, for the purpose of conducting investigations in the field of air hygiene. H. B. Meller, who has been appointed managing director, has begun a comprehensive investigation in which the hygienic, technologic, and economic aspects of air contamination, especially by dust, in the industries, will be studied.

EDITORIAL

Professional Labor Rebels Against "Political Python"

AN EDITORIAL which appeared recently in a Cleveland newspaper is creating widespread interest, first, because of the vigorous manner in which it attacks extravagant government expenditures, and second, because of the affiliations of the newspaper.

The editorial appeared under the title, "Taxing Industry Out of Business and Workers Out of Employment!" It sets forth in forceful language the argument that the "hope of increased standards of living can come not from attempting to 'divvy-up' the so-called wealth or from any other fool panacea, but only from creating more wealth." It points out that as the expenditures of the government mount, taxes rise in proportion. Higher taxes, it continues, "increase the cost of every product of agriculture or industry, thus forcing up the selling prices by even greater amounts and, in this way, cutting down still further the real income and the real purchasing power of the people of this country."

Would "Fire" Overlapping Boards, Bureaus, Committees, Commissions, Departments, etc.

After lamenting the fact that many persons do not realize that whatever the government spends eventually comes out of the pockets of the people, the editorial points with alarm to the extent that taxes are increasing by leaps and bounds. "These taxes," it declares, "are constantly freezing capital, strangling the very lifeblood out of industry and commerce (and hence employment) and are bedeviling our every step toward permanent economic recovery. . . ."

". . . . Are we to stand supinely by and watch our hard earned advantages retrenched until we retreat into the waiting arms of destructive dictatorships? Are American workers and American business men going to take a licking lying down, or are we going to wake up before it is too late. . . .?"

According to the editorial, the only way to deal effectively with this "political python" is "to kill it before it kills us." The method is "to fire the interlocking, overlapping boards, bureaus, departments, divisions, committees, commissions and all the other tax-taking, back-breaking barnacles of bureaucracy and use that tremendous saving of the taxpayers' money to rehabiltate, refresh and rejuvenate the tired arteries of trade and commerce."

Near the end of the editorial appears this arresting statement, "For every dollar we save in taxes, we can put about two dollars to work on the healthy side of industry with the resultant increase in jobs, wages, prosperity and happiness."

From the foregoing it will be apparent that the editorial is one of the most scathing attacks against senseless government bureaucracy that has appeared in the contemporary press. Had it appeared in a conservative journal sympathetic to the problems of "big business," it would have attracted attention because of the force of its argument and the vigor of its indignation.

Protest Emanates from Old-Line Labor Organ, Not from Propaganda Sheet of "Bourbons"

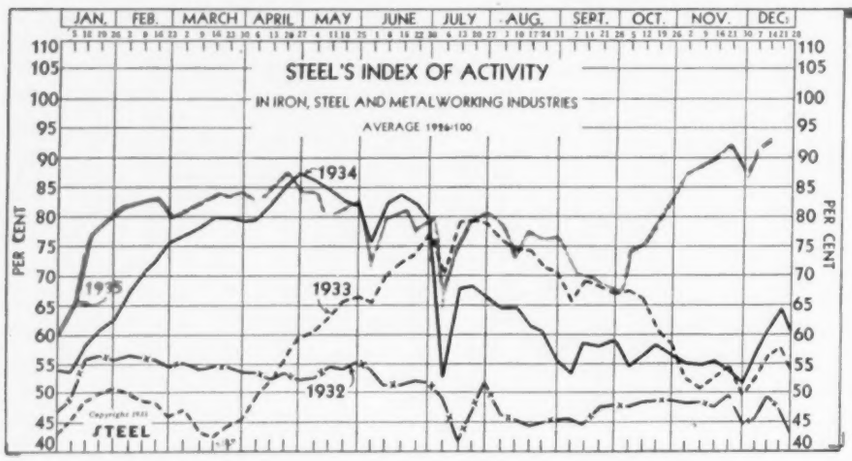
But this editorial did not spring forth from an organ of Wall street, nor from a source which by the wildest stretch of the imagination can be identified with the class of individuals designated by new dealers as "Tories" and "Bourbons." Instead, it came from *The Cleveland Citizen*, the official newspaper of organized labor in Cleveland—a publication which for 45 years has been identified with the better element of the professional labor movement.

This is the first important evidence that we have seen of a disposition on the part of the professional labor unions to seriously question or to denounce the activities of the new deal administration. From all outward appearances, the national officers of A. F. of L. continue to believe that the present government administration has been a friend of professional labor. They have been swept off their feet by the readiness with which new dealers have acquiesced to the demands of labor for discriminatory legislation. They have concentrated so much attention to the promise of artificial aid from the government in recruiting new members for unions that they have overlooked the new deal's major threat to labor.

But inevitably, the logic which dictated the editorial in *The Cleveland Citizen* will penetrate to the thinking personnel of professional labor. Labor union members soon will be balancing the questionable advantages of Section 7a and the Wagner disputes bill against the threat of being "taxed out of employment."

Professional labor is showing signs of emerging from the mesmeric spell cast by the honeyed promises of the new deal!

THE BUSINESS TREND



STEEL'S *index of activity in the iron, steel and metalworking industries increased 0.4 points to 92.1 in the week ending Dec. 14:*

Week ending	1935	1934	1933	1932
Sept. 28	68.5	59.3	66.9	47.7
Oct. 5	73.3	54.7	67.4	48.4
Oct. 12	74.9	56.4	66.0	48.7
Oct. 10	77.4	58.2	60.9	58.7
Oct. 26	82.4	56.3	58.0	48.3
Nov. 2	86.4	55.0	52.3	48.5
Nov. 9	88.4	54.9	50.7	47.7
Nov. 16	88.8	55.2	52.6	49.2
Nov. 23	90.9	54.4	55.4	44.5
Nov. 30	86.0	51.9	49.7	45.3
Dec. 7	91.7†	56.8	52.6	46.6
Dec. 14	92.1*	60.6	56.0	49.3

†Revised. *Preliminary.

The index charted above is based upon freight car loadings, electric power output, automobile assemblies (estimated by Cram's Reports) and the steelworks operating rate (estimated by STEEL). *Average for 1926 equals 100, weighted as follows: Steel rate 40, and car loadings, power output and auto assemblies each 20.*

Industry Is Due to Slacken Pace for Holiday Season

INDUSTRY has displayed its final burst of speed before the holiday season. From now on to the end of the year, its pace will be slower. A resumption of activity should take place early in January.

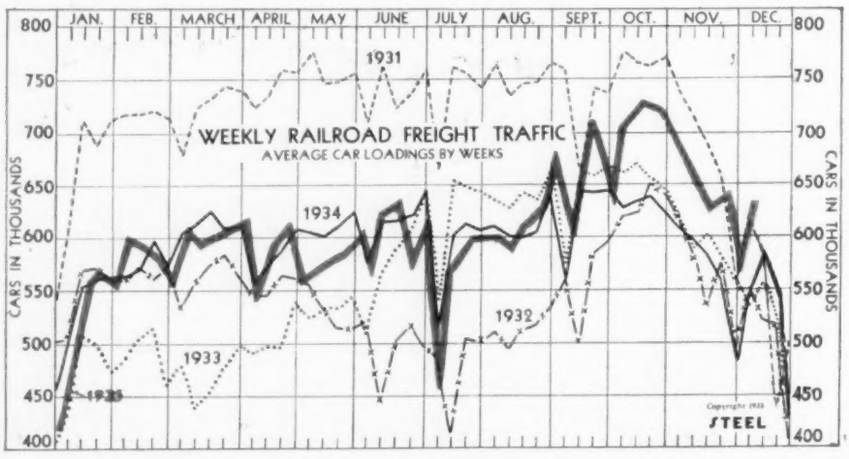
Last year the year-end holiday interruption was slight and of short duration in comparison with that of several preceding years. Activity in the metalworking industries mounted steadily to a peak in the week ending Dec. 22, slackened moderately in the succeeding week, and resumed its former pace in the first week of January.

It remains to be seen whether industry can recover as quickly in the approaching year-end period. STEEL's index of activity for December seems to be following the pattern traced a year ago. The index gained from 91.7 in the first week of the month to 92.1 in the second week. A further slight gain may be recorded for the week ending Dec. 21, after which a recession is likely.

The index has been receiving encouraging support from revenue car loadings thus far in December. For two weeks loadings have been at the rate of about 635,000 cars weekly. Loadings of 637,100 in the first week of December were the highest for any December week since 1930.

The index also reflects further improvement in automobile assemblies and electric power output. At 98,582 units in the second week of December, automobile production was close to the tentative goal of 100,000. Electric power output touched 1,983,400,000 kilowatt-hours, which strengthens our prediction that output in the week ending Dec. 21 will be near to 2,000,000,000.

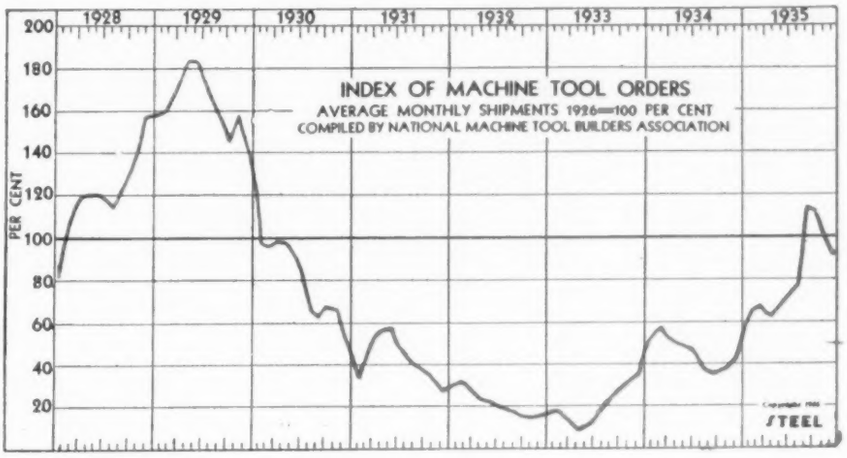
1935	
Dec. 7	637,133
Nov. 30	570,427
Nov. 23	646,503
Nov. 16	628,330
Nov. 9	653,525
Nov. 2	680,662
Oct. 26	707,826
Oct. 18	732,947
Oct. 12	734,274
Oct. 5	706,877
Sept. 28	630,771
Sept. 21	707,644
Sept. 14	700,356



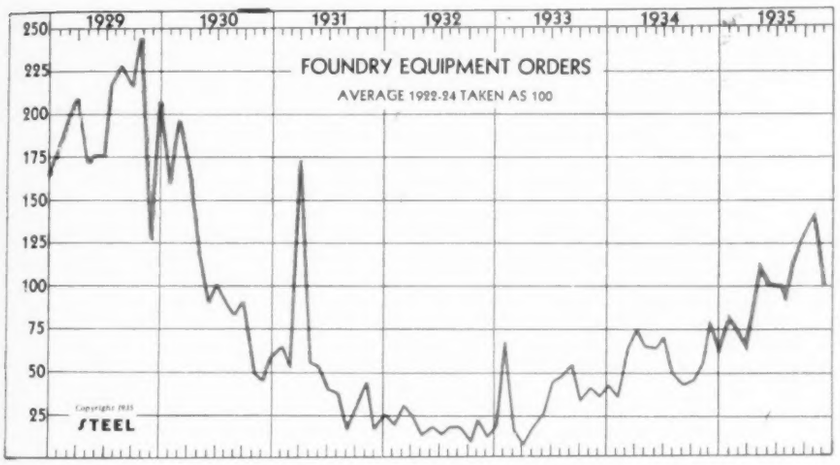
1934	
Dec. 8	551,490
Dec. 1	488,185
Nov. 24	561,942
Nov. 17	585,034
Nov. 10	594,790
Nov. 3	613,048
Oct. 27	624,808
Oct. 20	640,727
Oct. 13	636,999
Oct. 6	632,406
Sept. 29	646,084
Sept. 22	644,498
Sept. 15	647,485

Machine Tool Orders Taper in November

	1935	1934	1933	1932
Jan.	61.3	56.5	18.3	32.8
Feb.	61.5	58.2	15.2	30.4
March	60.3	50.9	11.1	23.9
April	60.3	48.5	8.3	20.6
May	67.1	46.8	10.6	20.8
June	76.7	42.6	15.5	21.7
July	94.7	38.6	22.4	18.7
Aug.	112.2	37.1	27.9	16.8
Sept.	108.5	37.4	30.9	15.3
Oct.	102.9	40.5	33.3	15.7
Nov.	93.8	44.2	38.0	16.4
Dec.	.....	54.1	51.0	17.6



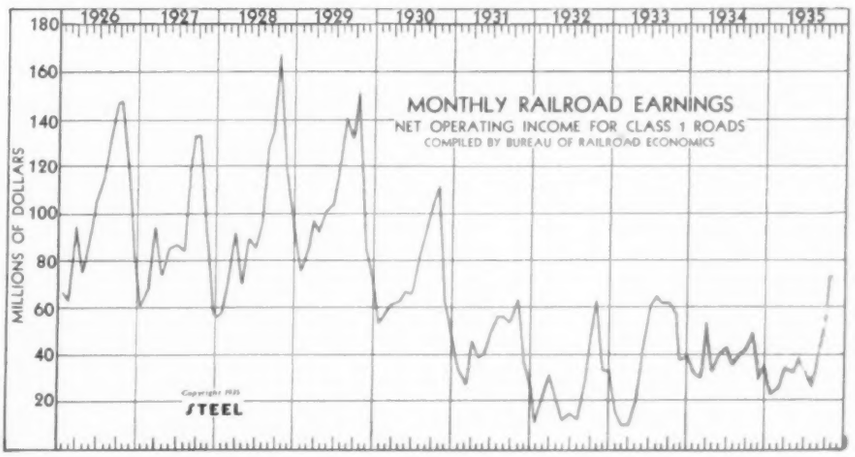
Foundry Equipment Orders Decline Moderately

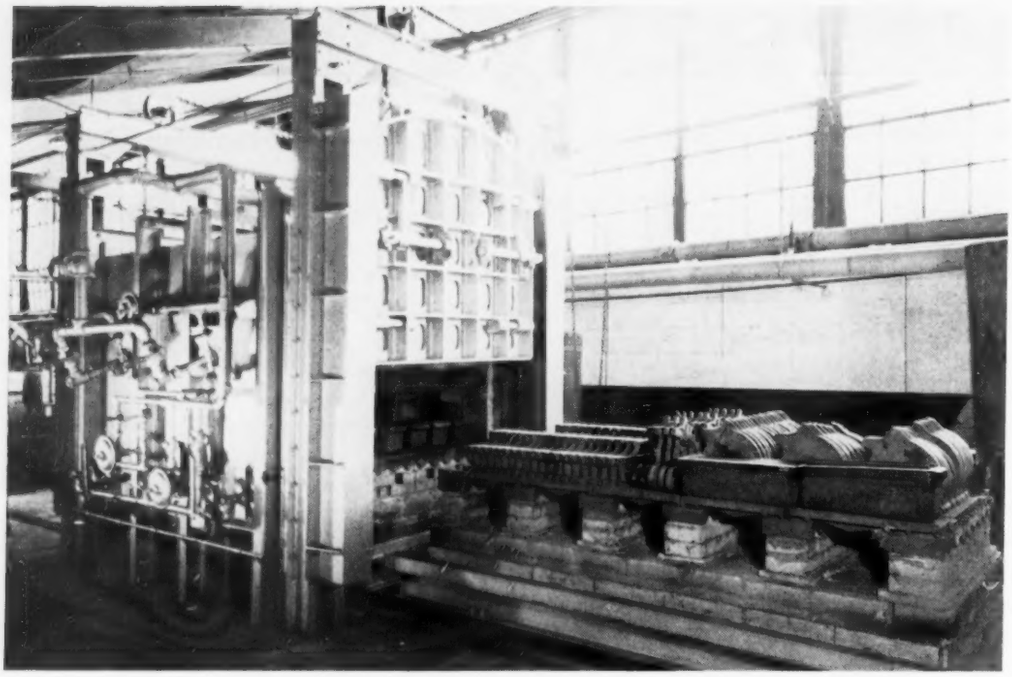


	Per Cent		
	1935	1934	1933
Jan.	86.6	37.2	68.4
Feb.	75.7	65.8	16.1
March	69.3	75.4	9.8
April	113.2	67.9	19.4
May	100.7	66.5	25.6
June	100.2	70.4	45.5
July	94.0	50.7	48.8
Aug.	113.0	43.1	56.3
Sept.	128.5	46.4	34.9
Oct.	140	55.3	42.5
Nov.	100.4	80.4	36.6
Dec.	.....	66.9	43.8

Railroads Earn 1.79% in First Ten Months

	1935	1934
Jan.	$21,348,557	$30,931,202
Feb.	25,719,919	29,281,013
March	37,850,965	52,037,848
April	34,625,786	32,264,610
May	39,505,069	39,494,978
June	34,024,691	41,836,302
July	26,851,397	35,220,809
Aug.	42,073,256	39,677,337
Sept.	57,359,339	41,020,485
Oct.	75,425,092	48,624,984
Nov.	.....	31,582,704
Dec.	.....	38,729,833





THROUGH . TYPE car bottom furnace used chiefly for annealing cast iron parts and for annealing Norway iron parts to obtain proper electrical properties. The latter are packed in cast iron chips to prevent oxidation

HEAT TREATING 1000 DIFFERENT PARTS

BY J. B. NEALEY

WHEN a plant is called upon to heat treat a thousand or more different metal parts it is a vital necessity to classify and simplify the many heat treating processes involved, commensurate with the physical characteristics required. This includes standardizing on a minimum variety of steels and alloys as well as standardizing on a minimum number of heat treatments. With this accomplished, it is then possible to plan a heat treating division with the least number and variety of furnaces and equipment and to decrease greatly the size of the personnel.

With this in view the International Business Machines Corp. recently rebuilt and re-equipped its heat treating division at its plant in Endicott, N. Y. This concern makes 115 different classes of machines and its plant includes 25 buildings with a combined floor space of 575,000 square feet, employing 3500. Machines are characterized by intricacy, large number of parts, precision of operation and long life. Some of these machines combine 25 or more separate accounting functions. An alphabet subtraction accounting machine, for example, has 50,000 separate pieces, comprising 2400 different parts, and contains 75 miles of wire connections.

In the construction of these machines, strength of materials is paramount, and for wearing parts the required physicals can be obtained only by heat treatment. This phase is handled in a modern and completely equipped heat treating division. As stated, a thousand different parts pass through here and simplification of heat treatments has been accomplished in part by selecting steels of only five analyses for most of the structural and working parts of the machines. These five analyses are S.A.E. 1010, 1020, 1112, 3115 and 3140. Depending upon the grade and requirements, these analyses are purchased in the form of hot-rolled and cold-drawn bar stock, forgings and cold-rolled strip. In addition to these Norway iron, nickel alloy magnetic iron and silicon iron are used extensively for magnet cores and armatures. The desired electrical properties are obtained by a final annealing treatment after the parts have been completely machined.

Beryllium copper, the new alloy of copper which under proper heat treatment develops a hardness comparable with tempered spring steel, and electrical conductivity equal to or better than that of brass and bronze, is also being used in appreciable amounts for various electrical contact parts.

The heat treatment for each part is specified on the blueprint and listed on the operation record which accompanies each manufacturing lot in process. . The manufaturing lots as received at the heat treatment department are delivered to one of three sections: Carburizing and annealing, case hardening, or the tool and die section. Gas fuel is used extensively, and there are 22 gas-fired furnaces and 7 electric furnaces in the department.

Box-type furnaces employed in the carburizing and annealing sections are gas fired and equipped with automatic temperature controls of the potentiometer type, operating on-and-off motor valves in the air lines. Air is supplied to all the furnaces from one blower at 1-pound pressure. The gas is dropped from line to atmospheric pressure and is inspirated at the burner by the air, the ratio of the two being exactly controlled by an automatic proportioning device. The temperature control valve is cut into the air line only. Five recording and controlling pyrometers are mounted in metal dustproof cases on the wall. The furnaces are all of insulating firebrick construction, encased in steel plates and provided with counterweight doors.

Steel plate aprons are used on these furnaces as an aid in loading and unloading, and likewise long-handled steel forks mounted on two small wheels are em-

ployed in handling large parts, carburizing boxes and the like. Small quench tanks are conveniently placed for hardening.

Carburizing in the above mentioned furnaces is accomplished by packing the steel parts with solid carburizer in alloy heat-resisting boxes and holding the charge at carburizing heat of 1550-1600 degrees Fahr. for 2½ to 5 hours, depending upon whether a case depth of 0.010, 0.015, 0.020-inch or over is required. Hardening practice varies in accordance with requirements, quenching direct from the box or cooling in the box and later reheating and quenching at 1450 degrees Fahr.

A small electric vertical retort type furnace for carburizing with city gas is also used for small parts which cannot be packed conveniently in boxes with solid carburizers. This furnace is equipped with a fan to provide forced circulation of the carburizing gases. This furnace is also used for annealing steel parts and nickel alloy magnetic iron parts.

Selective Hardening

Either copper plating or an anti-carburizing paint is employed for parts which require selective carburizing and hardening, as for instance gears and cams, which require a soft hub to permit taper pinning in assembly, or rivets which require soft tenon ends to permit easy riveting in assembly.

The car-bottom furnace has a door front and rear and a track running through for the cars. Car hearths are 4 x 8 feet, and there are two cars so that one can be loaded while the other is in the furnace. Heat is supplied through 16 gas burners, eight to a side, and of these eight, three are large overfiring burners and five are small underfiring. The car hearths are of heat-resisting cast alloy iron sections setting on refractory piers on the car top and the lower burners fire between these piers. This furnace is used chiefly for the annealing of cast iron to relieve casting strains and improve machinability, and for the annealing of Norway iron to obtain proper electrical properties. In order to prevent surface oxidation, the Norway iron parts are packed with cast iron chips in heat-resisting alloy iron boxes of suitable size.

The case hardening section contains seven standard pot furnaces 3 feet in diameter, 4 feet high and hooded with induced draft for fume removal. Cyanide or other commercial salts having similar case hardening effects are used in these pot furnaces. The pots are 12 x 18 inches and each furnace is heated with two or three gas burners of the type already described, firing tangentially to the pots and located close to the top of the furnaces. The waste products of combustion are vented near the bottom. Each furnace is built of 4½ inches of firebrick and 4½ inches of insulation and is encased in a steel shell. Automatic temperature control is provided. Pot life of 7500 heat hours is not unusual.

In front of the pot furnaces are three rectangular steel quench tanks for oil and two circular ones for water. These are served with chain hoists and steel baskets operating back and forth on an overhead rail. Above these tanks is a system of pipe coils comprising 3-inch pipes with 1½-inch pipes inside. The oil is pumped through the larger pipes and is cooled by cold water circulated through the smaller ones. A control board contains seven indicating and controlling pyrometers. Gears, cams, screws and small parts of S.A.E. 1010 and 3115 steel are case hardened here by quenching at 1500-1550 degrees Fahr.

Cases are too thin to give an accurate Rockwell C scale reading, but the hardness is equivalent to file hardness.

For the hardening of high speed steel, two oven-type electric furnaces equipped with gas curtains at the door openings are used. The gas curtain provides the necessary atmospheric control within the furnace and prevents the oxidation and scaling of parts. The high-speed steel preheat furnace is of the resistance wire type for temperatures up to 1850 degrees Fahr. The final or high heat furnace is of the Globar type for temperatures up to 2500 degrees Fahr.

Other Furnace Equipment

A box-type furnace underfired with four gas burners and the above mentioned electric preheat furnace are used also for hardening stainless steel, carbon tool steel, blanking and shaving dies of high-carbon high-chromium steel.

There are three pot furnaces in one of which a neutral salt is used for hardening high-carbon steel parts. These are heated with two gas burners each. Three nitrate baths, each fired with a single gas burner, are available for tempering and bluing operations.

Beryllium copper, as mentioned before, is finding widespread application for various electrical contact parts. Material has the following composition:

	Per cent
Beryllium	2.00-2.25
Nickel	0.25-0.50
Iron	0.10 maximum
Copper	balance

Treatment involves heating at 530 degrees Fahr. for periods of approximately 1 to 5½ hours, depending upon the ultimate hardness and physical properties desired, and also the amount of cold working the parts

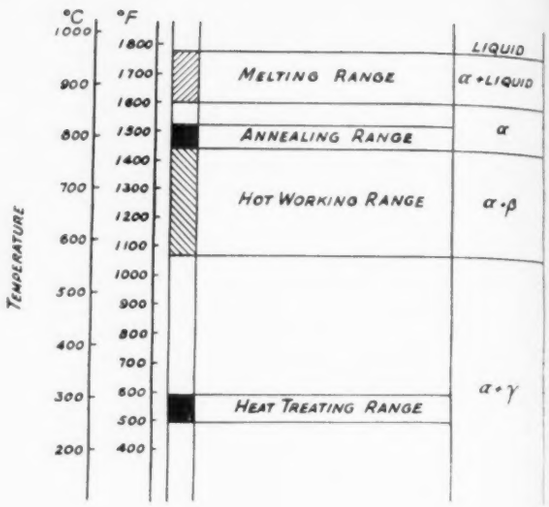
SEVEN pot furnaces for case hardening operations. The units are gas fired and are hooded, with induced draft for fume removal

may have received prior to the heat treatment.

An oil quench is held in a water jacketed steel tank. Cold water is circulated in pipe coils within the jacket and the work is handled with a hoist suspended from an overhead trolley. Water and brine quenches are contained in two cylindrical tanks.

Beryllium copper is so new that all of its properties are not generally known. Its chief advantage is that it can be cold worked into intricate shapes while in the soft annealed state and then hardened by heat treatment. It has a wide range of mechanical properties. In its soft annealed state it has a tensile strength of approximately 70,000 pounds per square inch and this can be increased to approximately 200,000 pounds per square inch with the proper heat treatment. As to fatigue resistance, endurance limits are greater than 40,000 pounds per square inch. What this means when used for vibrator arms, motor brushes, spring snap switch blades, and the like, can be appreciated readily.

Cold working hardens beryllium copper, sometimes requiring annealing. The metal must also be annealed after hot working. Holding it at 1470 degrees Fahr for 15 or 30 minutes and then immediately quenching it in water will accomplish this. However, after hot working at a temperature of 1065 to 1425 degrees Fahr. in order to restore the metal so that it will respond to heat treatment, it must be annealed or heated for 3 hours at this 1470-degree temperature and then quenched in water.



TEMPERATURE ranges important in the fabrication and heat treatment of beryllium copper

Seek Measure for Success In Engineering Courses

If a boy is proficient in mathematics in high or preparatory school is he likely to make a success of an engineering course in college? Suppose he is a good speller, or has a good vocabulary, or can write a good letter or report, do those accomplishments have any bearing on the question of whether he should take up engineering? These are some of the things that the committee on student selection and guidance of the Engineers' Council for Professional Development is working out.

Preliminary results indicate that the answer to the first question is "yes." The indicated answer to the second question is that a student proficient in the various branches of English is adaptable to engineering work. Ability in the use of English is about as necessary as to be proficient in mathematics.

Other tests of engineering aptitude also are being developed. It has been found that ability in descriptive geometry is an especially good criterion of the probable success of a student in engineering curricula, and it is hoped that a test can be devised for potential engineering students that will measure the same quality of imagination that descriptive geometry does. R. L. Sackett, dean of the school of engineering, Pennsylvania State college, State College, Pa., as chairman of the committee, is directing the work.

Another important phase of the committee's activities is the organization of guidance programs and procedures for the aid of preparatory school students. Wide distribution of a pamphlet, "Engineering: A Career—A Culture," has been a valuable aid. Copies of this pamphlet may be obtained from the council's headquarters at 29 West Thirty-ninth street, New York, for 15 cents each.

Though only one of four major activities of the council, student selection and guidance is fundamentally the most important, for it seeks to awaken an interest in engineering in those young men who are likely to achieve the highest success in the engineering field. If only the right men are encouraged to enter engineering schools, a long step will have been taken toward increasing the recognition accorded to the profession.

Demonstrates Weld Can Take It

TEST PROVES IMPACT VALUE OF WELDS MADE BY THE ELECTRIC ARC: An unusual test to determine the impact strength of welds in construction of oil barges was made recently by the Marietta Mfg. Co., Point Pleasant, W. Va. A 12-inch box section was built up by welding two standard 12-inch channels together with a ½-inch plate 12 inches wide. This box section was placed on railroad ties spaced 8 feet apart, then an 1800-pound weight was dropped on it approximately 100 times, starting from a height of 3 feet and continuing until a maximum of six times from 50, 60 and finally 75 feet was reached. Condition of the section after completion of the test is shown in the accompanying illustration. The weld was a ½-inch fillet weld made in two passes with shielded arc welding equipment supplied by the Lincoln Electric Co., Cleveland

Free Cutting Aluminum for Screw Machine Work

ONE of the most important characteristics of a good machining metal is its ability to discard scrap quickly. A clean-cutting material does not impede the cutting tool and assures a more accurate cut. In addition, tools retain their sharpness longer because larger entrant angles may be used without diminishing the quality of the surface finish.

Long shavings are not only annoying, but they also retard operation. This is particularly true of the metal used in automatic screw machines, where speed, many times that of a hand-operated lathe, makes "free cutting" an absolute essential. This is a term coined to denote the rapid breaking up of cut scrap so that it falls away from the machined piece, leaving the metal surface clean and not cluttered, for the oncoming tool.

Aluminum, because of the development of certain alloys, has now been added to the list of metals which the trade terms "free cutting." Commercially pure aluminum is not adaptable for general use in automatic screw machines, but high strength, heat treated aluminum alloys have, to a considerable degree, the properties desirable for the production of screw machine parts.

Try Addition of Lead

A technique was developed by Aluminum Co. of America which greatly reduced the difference in machining costs between free-cutting brass and heat treated strong aluminum alloys. An even more free cutting aluminum alloy has long been needed, however, and a study has been carried on over a number of years to bring about the development of such a material. The success of leaded brass screw machine rod interested aluminum research scientists, but whenever lead was added to aluminum-copper alloys in the experiments the result was failure.

During some of the experiments it was demonstrated that alloys sufficiently high in copper (8 per cent and above) machined fairly well, but these alloys could not be commercially hot rolled to rod because of hot shortness associated with the high alloy content.

The addition of tin in certain concentrations would impart free cutting properties to some of the heat treatable wrought alloys, but it would so impair their hot working characteristics that the economic production of screw machine rod from them was impractical.

Scientific thought, though repulsed, returned again to a consideration of the possibilities of alloying lead and aluminum. In the course of another investigation an occasion arose when molten aluminum was fluxed with various lead salts. Subsequent analysis indicated the presence of lead in such concentration that complete quantitative reduction of the salt and solution of the lead in the liquid metal had taken place. Finally the alloying of metallic lead and aluminum was worked out and the solubility of lead in liquid aluminum established. The new alloys, with sufficient amounts of lead present, were found to be actually free cutting.

Lathe Set Up for Test

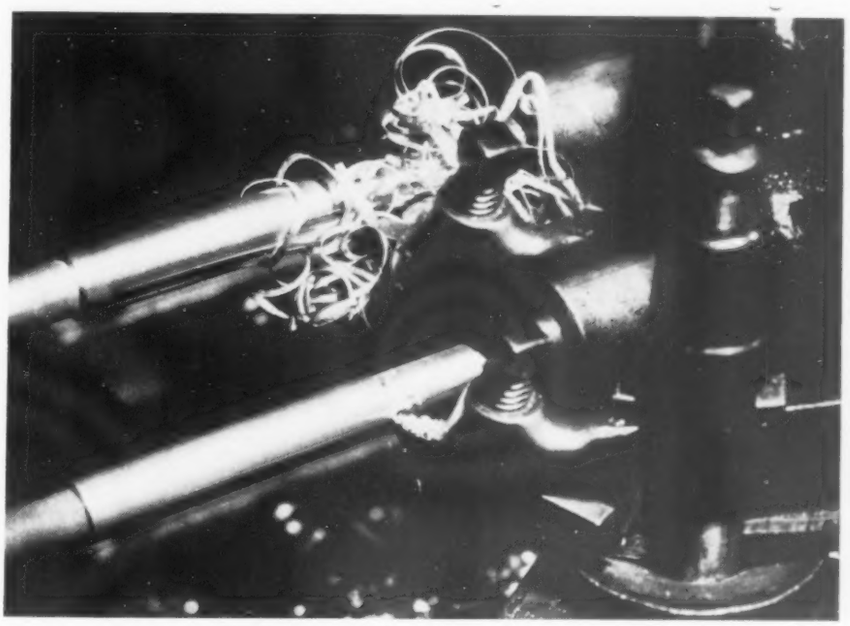
A preliminary test to determine the free cutting qualities of the alloys was made by measuring tool wear and the power to remove a unit volume of metal. To examine the chip size and the finish, a lathe tool was used which would give long continuous chips and a relatively poor finish with most wrought aluminum alloys, but at the same time would give small, well broken up chips and a good finish with free cutting brass. Such an arbitrary method of evaluation could not indicate quantitatively the performance of a material in all the variety of operations on a screw machine, and so the new alloy was subjected to actual screw machine operations. The simplified test proved to be accurate. A material which gave fine, well broken chips in the test performed similarly in the screw machine, although marginal alloys might show a revision to long, stringy chips in critical operations.

Chip Size Is Guide

Subsequent measurements made by means of a specially adapted Charpy impact machine, a dynamometer tool of the Boston type, and Croft's sawing test, indicated that the chip size was a much better criterion of free cutting properties than power or tool wear measurements. Chip size was also an excellent indicator of finish as well, for the finish improved as the chip size decreased.

The concentration of lead required for satisfactory machinability in the commonly used strong alloys was found to be too high for the practical production of ingots uniform in chemical composition. Even small ingots of fairly uniform composition were difficult to work hot.

A solution to the problem arose in the discovery that the simultaneous presence of small concentrations of a multiplicity of elements was much more efficient in producing satisfactory machinability than any one element alone. From a number of elements found to be satisfactory lead and bismuth were chosen to supply the multiplicity because it was further found that these elements had relatively small effect



Two turning lathes, upper showing metal lacking free cutting qualities, lower showing one of the new free cutting aluminum alloys

on the other properties of the alloy. The effect of copper on machinability was also kept in mind, and its concentration was placed at about the maximum for the satisfactory hot working of large ingots. This, then, is one of a number of possible alloys having free cutting qualities.

In the T temper, which is the condition of the metal after the application of both solution and precipitation heat treatments, the tensile properties do not differ greatly from those of the duralumin-type alloys or free cutting brass. But in the W temper (solution heat treatment only) the alloy is a relatively soft material of excellent machinability which can be satisfactorily cold worked, while the wide range of mechanical properties offers opportunities for broad application and improved products.

Magnesium Improves Aging

It was found that duralumin-type alloys, which develop their optimum properties on aging at room temperature, are generally tougher for the same tensile strength than alloys which are aged at elevated temperatures. In order to induce aging at room temperature, magnesium was added to the aluminum-copper-lead-bismuth alloy, but this resulted in the impairment of the free cutting properties of the alloy. It was discovered that with the addition of certain alloying elements, the desirable cutting characteristics were regained and exact composition limits were worked out. The alloy in the W temper was found to have properties comparable to those of duralumin and free cutting brass in both strength and toughness. In the T temper, involving aging at slightly elevated temperatures following a solution heat treatment, high yield, tensile and shear strengths were obtained, although this was done at the expense of some elongation and toughness.

In recapitulating it may be seen that there are now available two alloys, one with magnesium content, one without, in two tempers, so that there is a choice from four different materials to be made. Considerable production experience has been accumulated in the use of all of these materials.

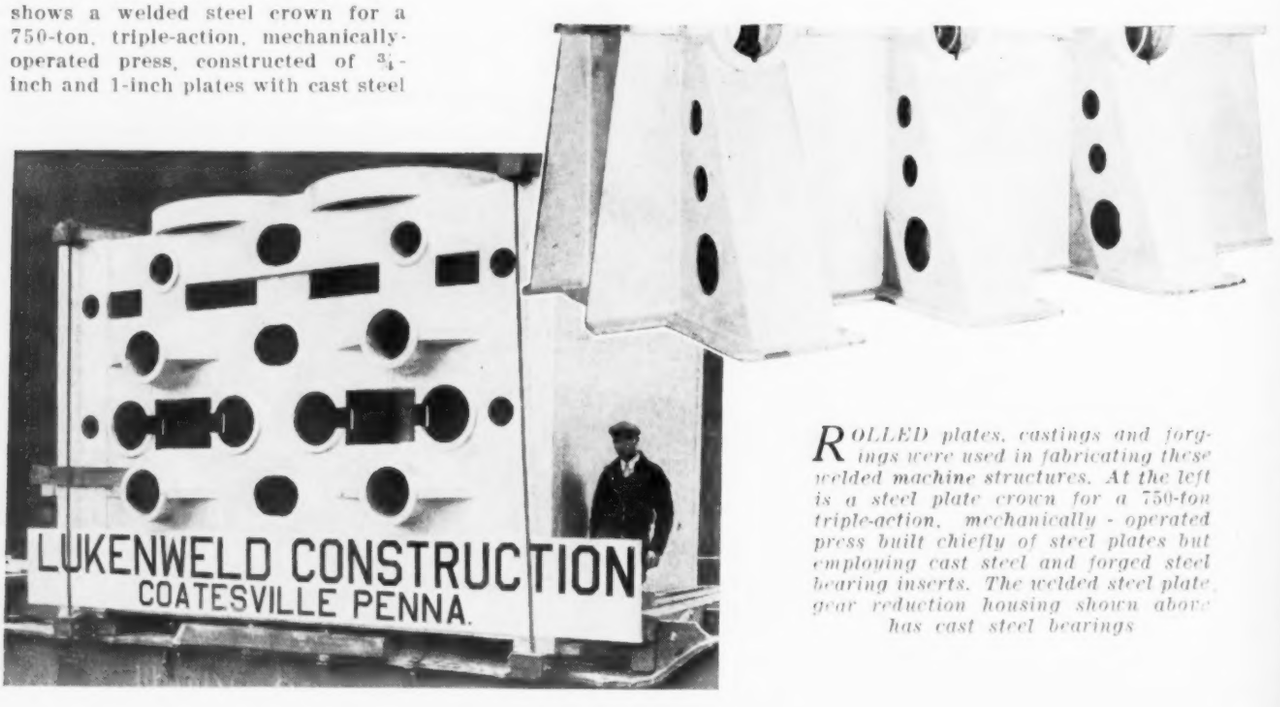
Welded Assemblies Utilize Plates, Castings and Forgings

ALTHOUGH welded steel plate construction is being used more extensively in the fabrication of heavy machinery, engineers recognize that cast steel, forged steel and cast iron have characteristics which recommend their use for certain component parts; therefore, the most efficient assembly is provided when the proper materials are used in the proper place. Two examples of composite construction, both fabricated by Lukenweld Inc., Coatesville, Pa., are shown in the accompanying illustrations.

The illustration at the lower left shows a welded steel crown for a 750-ton, triple-action, mechanically-operated press, constructed of ¾-inch and 1-inch plates with cast steel and forged steel bearing inserts. It was built for the Clearing Machine Corp., Chicago. The cranks and crank gearings operate on the interior of the crown and certain portions of the crown act as large oil reservoirs, thereby insuring adequate lubrication being maintained on these parts.

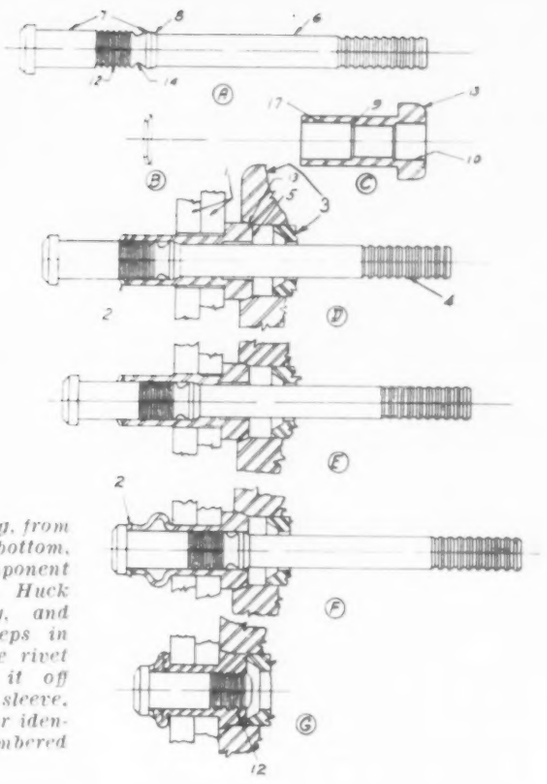
Weighing 79,620 pounds as shipped, the crown is 15 feet long, 11 feet ½ inch wide and 10 feet 4½ inches high. The assembly was thoroughly sand blasted to remove mill scale, then was normalized to relieve stresses. It was carefully tested for possible oil leaks.

A welded steel gear reduction housing for dredging service, built for the Standard Dredging Co., New York, is shown in the illustration at the upper right. This housing, which weighs 12,400 pounds, was fabricated from formed steel plates and steel castings for the bearings. Before leaving the plant, the assembly was thoroughly sand blasted and normalized.



ROLLED plates, castings and forgings were used in fabricating these welded machine structures. At the left is a steel plate crown for a 750-ton triple-action, mechanically-operated press built chiefly of steel plates but employing cast steel and forged steel bearing inserts. The welded steel plate gear reduction housing shown above has cast steel bearings

Driving and Backing Up Rivets from One Side Possible with New Tool



THIS drawing, from top to bottom, shows the component parts of the Huck rivet assembly, and the various steps in drawing up the rivet and breaking it off flush with the sleeve. Refer to text for identification of numbered parts

WHERE access to both sides of the work is not possible, riveting can be accomplished successfully by a new process developed by the Huck rivet division of Clark Equipment Co., Buchanan, Mich. The new method makes it possible both to drive and back up rivets from one side of the work, by means of a special type of rivet assembly and gun.

Referring to the accompanying drawing, *A*, *B* and *C* illustrate the three component parts of the Huck rivet, namely, the pin, spreader ring and sleeve. *D* shows the assembly as supplied to users, the plates (1) provided with 21/63-inch clearance holes for a 5/16-inch rivet, representing the work to be riveted. The pin is a tight press fit in the sleeve and the spreader ring is positioned as shown at 2.

Hydraulic Pressure Supplied

The riveting gun is shown in an illustration herewith; it may be applied to the rivets after they have been stuck, or if preferred, the rivets may be first inserted in the gun through the anvil (3 in the sketch). Jaws in the gun automatically engage pull grooves (4) of the pin and when either one of the gun triggers is depressed, a remote control solenoid operated valve causes an electric hydraulic pressure unit to supply oil under pressure through flexible hoses to the riveting gun, causing the jaws, which have engaged the pull grooves of the pin, to move away from the anvil. The angle (13) on the head of the sleeve (5) rests against the anvil (3) of the gun and takes the entire reaction of the pull on the pin.

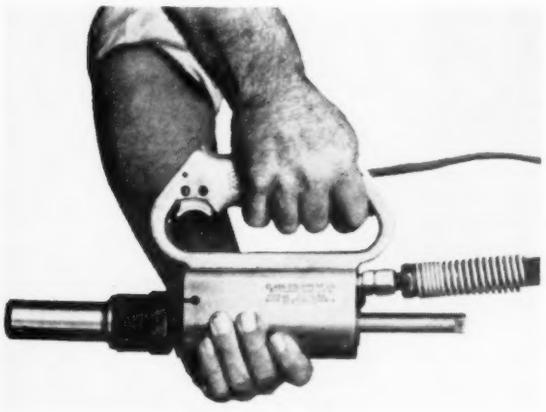
The pin has a small diameter (6) and a large diameter (7), which two diameters are connected by an extruding angle (8). The tube end of the sleeve is counterbored to a larger diameter (17) and in the assembled rivet the extruding angle rests against a shoulder (9) at the bottom of this sleeve counterbore. As the pin is drawn through the sleeve, the extruding angle is drawn into the smaller diameter of the hole of the sleeve, spreading the sleeve to fill the clearance in the hole in the work as illustrated at *E*.

Just before the head of the pin contacts the spreader ring, the extruding angle has passed into the counterbore (10) in the original head of the sleeve, thereby relieving most of the pull on the pin that had been required to extrude the metal in the sleeve to fill the hole in the work. Further travel of the pin flattens out the spreader ring as shown at *F*, thereby increasing its area of contact with the sleeve. Continued travel of the pin causes the sleeve to bulb, eventually forming a head which is pulled down solidly against the plate, as shown at *G*, and as the pull on the pin increases still further the plates are pulled together tightly.

Pin Is Broken Off

At this point, locking grooves (12) on the pin are positioned in the original head of the sleeve. Up to this point the angle on the sleeve head, resting against a corresponding angle in the anvil of the gun, has been able to support the entire reaction of the pull of the gun on the pin, which is approximately 6500 pounds. However, as this pull continues to build up, the angle is no longer able to absorb the reaction and the gun anvil passes over the head of the sleeve, swaging the material into the locking grooves of the pin.

The pull on the pin then continues to build up until the pin is broken in tension at the breakneck groove (14), at which time the riveting operation is completed as shown at *G*. When the gun trigger is released, the remote control valve reverses the flow of oil and the return stroke of



SPECIAL type of riveting gun, hydraulically powered, with which it is possible both to drive and back up rivets from one side of the work

the gun disengages the swaged head of the rivet from the gun anvil. When the next rivet is inserted, the small diameter part of the pin remaining in the gun is pushed through the gun and ejected.

The entire cycle, including the release of the gun from the swaged head, takes less than one second. Weight of the gun is 9 pounds.

Strength in shear of the Huck rivets is said to be approximately twice as great as that of standard rivets, and the strength in tension materially greater. Frictional value, due to the pressure with which the riveted parts are pulled together, is claimed substantially greater than in the case of hot or cold hammered rivets.

Review Progress in Castings and Use Of Welding in Combination Structures

PROGRESS in castings manufacture was stressed Dec. 11 at a meeting of the Cleveland section of the American Welding society. A. E. Gibson, vice president, Wellman Engineering Co., Cleveland, chairman of the chapter, presided and in his introductory remarks paid tribute to the advance made in castings manufacture during the past 10 or 15 years.

At the beginning of that period, navy specifications for gray iron called for 18,000 pounds per square inch tensile test. At present high strength castings regularly are produced and used in the manufacture of heavy machinery which show 50,000 pounds per square inch tensile and 500 brinell hardness.

Maj. R. A. Bull, Chicago, steel foundry consultant, addressed the meeting on steel castings. Recent advancements are typified by 25 different A.S.T.M. specifications for alloy steel of which 12 have been established since 1932 and of these, nine were specified in 1935.

The flexibility attainable in meeting various requirements in steel castings production, is due to wide use of electric furnaces. About 165 plants making steel castings now employ this melting medium. They can produce steel ranging from 75,000 to 150,000 pounds per square inch tensile with yield points within the range of 40,000 to 125,000 pounds per square inch.

Special alloy steel castings are available to meet practically every engineering requirement. Twelve A.S.T.M. grades embrace high alloys, many corrosion resistant, not including the 18-8 series. Eight compositions for high temperature service for the oil and power industries are typical of such special products. No less than 75 different grades of alloy steel are being regularly manufactured by American steel castings plants.

Major Bull mentioned the availability of combination structures employing steel castings to provide the more complicated portions to which simpler forms of rolled materials may be welded. The economy of such combination structures is influenced by the number of pieces required and designs are possible in castings that would not be obtainable by other means, particularly where it is necessary to support stress in all directions.

In discussing the metallurgy of steel castings and drawing inferences as to adaptability to welding, the speaker cautioned against acceptance of old theories. It is impossible to forecast definitely the effect of various alloying agents, unless the influence of all other factors is considered. For example, relatively large amounts of phosphorus may be present and not injurious, when carbon is low. Copper additions are being used up to 2 per cent depending upon the proportion of other elements.

Prejudices Yield to Progress

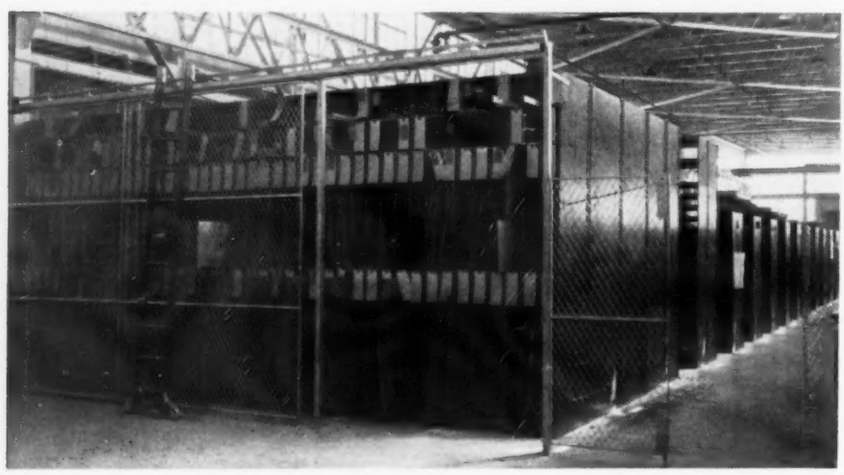
The speaker stated that both welded structures and castings now are giving splendid service. Preconceived prejudices against castings on the grounds of shrinkage, dirt and other conditions have been overcome by progress in foundry practice.

Developments in high strength gray iron castings were outlined by A. C. Denison, president, Fulton Foundry & Machine Co., Cleveland. He noted revisions in gray iron specifications largely made at the demand of the producers. He disapproved the use of the term high tensile as applied to materials now readily available in gray iron castings, explaining that glass may develop as high as 400,000 pounds per square inch tensile but it is not available for use generally as an engineering material.

Therefore, modern gray iron should be characterized as high strength. Strength is determined by the crystal structure and is attainable by special control methods, either involving alloys or as in the case of Meehanite made by Mr. Denison's foundry, by the addition of calcium silicide to a mixture giving the hypoeutectic structure.

Albert Williams, welding engineer, Wellman Engineering Co., Cleveland, presented a paper on welding of high-strength materials. He dealt with various new alloys, including copper-bearing steels which had been mentioned by previous speakers.

"Hasn't Scratched Yet"



DURALUMIN sheets and bars are stored in this steel shelving rack at the Sikorsky airplane plant in Bridgeport, Conn. The stored material, while thin and light, is extremely hard and must be stored on edge to avoid scratches which might later give rise to failures. Built by Lyon Metal Products Inc., Aurora, Ill., the shelving rack is 21 feet wide, 11 feet deep and 10 feet high. Uprights are placed on 6-inch centers. Shelves for the rack are about 6 inches wide and are equipped with 20-gage lining sheets to provide smooth surface over which the duralumin may slide freely. Upper part of the rack is divided into openings on 10-inch centers, used for boxes storing duralumin bars

Mechanism of Brass Plating

BY C. B. F. YOUNG
Technical Director,
United States Research Corp.,
Long Island City, N. Y.

BRASS plating has many applications, but its function is purely ornamental and it should never be used for protection against corrosion.

Curiously, brass plating was not developed by careful research, but is a product of the "hit or miss" era. Most present knowledge has been obtained from the practical man. The conditions as to solution composition, etc., which determine a specified color, are the ones which will be used.

In order to plate an alloy (brass being an alloy of zinc and copper), it is necessary to deposit at the cathode two or more metals simultaneously. For such to take place, it is necessary to have the normal cathode potentials of the two metals equal, or nearly so. If the normal cathode potentials of zinc and copper are measured they are found to lie far apart. Zinc has a potential of −0.76-volt, while copper has a potential of + 0.34-volt. These potentials are obtained from a sulphate solution containing normal metal ion concentrations, and are based on the hydrogen electrode as zero volts. If we can change the normal potential of zinc and copper so that they are approximately the same these two metals will be deposited at the same time.

Cyanide Baths Practical

It is possible to deposit copper and zinc simultaneously from the sulphate solutions[1], but the bath is not as yet commercially feasible because of several objections. These will not be discussed here. On the other hand, it is practical to deposit brass from cyanide baths because of the close potentials of copper and zinc in this solution. It must be appreciated that the potential of a metal depends largely upon the solution.

The potential of a metal may be changed in several ways: (1) by increasing or decreasing the metallic ion; (2) by changing the hydrogen ion concentration of the solution; (3) by increasing or decreasing the ionization of the salt producing the metallic ion; (4) by agitation of the solution; (5) by regulating temperature of the solution, and (6) by use of certain colloidal or addition agents.

The potential of copper in the sulphate solution is, as has been pointed out, +0.34-volt, while that of zinc is −0.76-volt, a difference of 1.1 volts. Therefore, it is not practical to deposit these two simultaneously from the sulphate solution at the present time. It may be possible in the future to accomplish this by adjusting the six variables mentioned above. This will depend upon the outcome of current scientific research in the field.

On the other hand, the cyanides are different from the sulphates. The cyanide solutions are ionized poorly, that is, the metallic cyanides, when dissolved in water, produce only small amounts of the metallic ions. The metallic sulphates ionize readily and produce metallic ions freely. If the complex cyanide of copper were formed as readily as the complex zinc cyanides, the same difference of potential would exist between copper and zinc because the two ion concentrations would be reduced proportionally.

If it is possible to reduce the concentration of one ion faster than the other, the potentials of the two will grow smaller or larger, according to the change. The first is the case in the plating of brass from cyanide solutions. By forming double cyanides, the potential of copper is reduced much faster than the potential of zinc. This is specially true if an excess of cyanide is present. As the potential of copper grows less and less, it finally becomes equal to the potential of zinc. It is true that the potential of zinc does not remain constant while the copper is changing, but the copper decreases faster than the zinc. When the potential of copper equals that of zinc, the two metals are deposited together.

Controlling Color of Brass

In order to deposit the same color brass (or the same composition) continuously, it is necessary that the concentration of zinc, copper, free cyanide, etc. remain constant. For this to happen, it is necessary that zinc and copper dissolve at the anode as fast as they are deposited at the cathode. The free cyanide content should not increase or decrease, as an increase gives less copper or a whiter brass, while a decrease gives an alloy containing more copper or a redder brass.

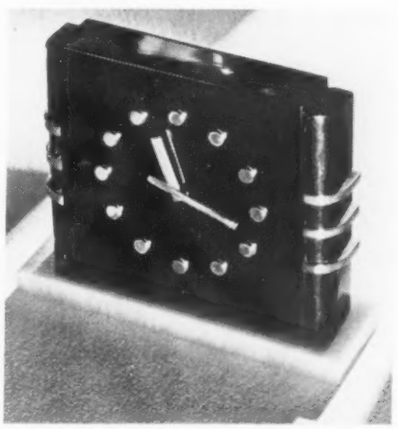
If the current density is increased, the zinc content of the alloy increases accordingly, while a rise in the temperature gives a rise in the percentage of copper of the alloy.

Many platers have thought that hydrogen ion concentration of a brass plating solution was unimportant, but recent work has proved this assumption wrong. The hydrogen ion concentration of a brass plating solution should be around eleven, determined colorimetrically. Any correction for a high concentration of hydrogen ions should be made using sodium hydroxide or ammonium hydroxide. If the solution is too basic, a dilute solution of sulphuric acid should be added. This should be done carefully. The solution should be agitated while the acid is being added. Sulphuric acid, if added in too great a quantity, will liberate hydrocyanic acid which is poisonous.

The best indicator is prepared by dissolving 0.6-gram thymolphthalein

(Please turn to Page 34)

Metals and Plastics



METALS and plastics are combined in the design of this modern timepiece, the work of Joseph B. Federico, industrial designer with Tri-Art Associates, Buffalo. Case and base are plastics, the former black Durez, the latter cherry red Catalin. Grilles are of die cast zinc, chromium plated. The hour points and hands are of chromium plated brass. Face has been so designed as to allow varying the appearance, if desired, such as by using a brushed aluminum band with black numerals

[1] Fink and Young. "Co-Deposition of Zinc and Cadmium from Acid Sulphate Solutions." *Transactions* American Electrochemical Society, Vol. 67, Preprint No. 13.

Surface Treatment

Standardization of Finishes Will Promote Economy

STANDARDIZATION of the unit processes and materials is as great an economic factor in finish practice as it is in any other branch of production. By standardizing each process in the production of finishes it will be found that a system which is extremely flexible and which yet affords a maximum of control by specification can be developed. A system, of the type to be described, will allow a finishing department to apply special finishes to certain small jobs without hampering its production stride, and will greatly facilitate quick changes in setup when changing over from one job to another. To illustrate what is meant, a system patterned after that used by one of the largest consumers of finishing materials in this country will be cited as an example.

Designations Are Employed

To begin with, there will be several methods of surface preparation which will be designated as *A*, *B*, *C*, *D*, *E*, as follows:

Surface Preparation

	Method
Clean, but otherwise unprepared	A
Scratchbrushed	B
Sandpapered	C
Sandblasted	D
Phosphate-processed	E

This list can be expanded to include sherardizing, zinc plating, bright acid dip, and any other special treatment which may be desired.

Next will come the priming or base coats of finishing material, which will be listed, for purposes of illustration, as follows:

Primers	Specification No.
Black japan	10
Iron oxide primer	11
Gray lacquer primer	12

Next, color coats are listed and specified according to the following arrangement:

Material	Specification No.
Light bronze crinkled lacquer	100
Light gray enamel	101
Aluminum enamel, baked	102
Oxidized bronze (in lacquer)	103

Finally there are a number of finishing and special coatings which require separate consideration:

Final Coatings	Specification No.
Clear lacquer	200
Flat clear lacquer	201
Mist coating of aluminum	202

Each of the above listed unit processes and materials is completely covered by a factory specification which outlines to the operator the name of the material, the manufacturer (there may be several, with a slightly altered procedure for each), the amount of thinner to be used, the baking or drying procedure, and any special instructions which may be necessary.

With this rudimentary system, we are now ready to specify complete finish and for the first example we will take rugged type of finish as follows:

Name	Specification No.
Outside baked aluminum finish	1000
Surface preparation	E
Primer (one coat)	11
Aluminum enamel, baked (one coat)	102

Note: If desired, special surface treatments, such as sandpapering the priming coat, can be introduced by specifying them in the proper order.

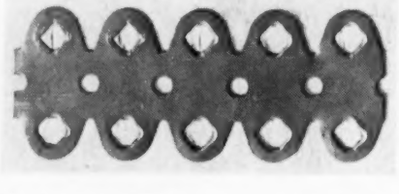
Another type of finish, which illustrates the idea further, is the following:

Name	Specification No.
Silver bronze crinkle finish	1001
Surface preparation	A
Color coat (one coat)	100
Special coat	202
Final coat (two coats)	200

THIS system can be expanded at will, and will allow for an almost unlimited variety of finishes, each of which will meet with special requirements, with a minimum of materials in each group. The great advantage of this system lies in the fact that as new and better materials are discovered in each group, the specifications for individual materials can be altered without disturbing the entire system which may be using these materials.

This system also eliminates the use of voluminous specifications which minutely describe each complete finish, which leads to confusion if the manufacturer is using many types of finishes. In addition to this

Colored Reinforcing Strip



LACQUERED steel strip for reinforcing paper and cardboard boxes now is being furnished by Wickwire Spencer Steel Co., 41 East Forty-second street, New York. It is supplied in coils, either plain or perforated, in the thicknesses of 0.007 to 0.0075-inch thick and in widths of ½-inch to 2 inches. Typical perforated pattern shown in this illustration was made for National Metal Edge Box Co., Philadelphia. Lacquer in any color is applied by rolling after which the coating is baked in an electric furnace. As a test, samples of the strip are passed through a porcupine roller which indicates the strength, elasticity and adherence of the baked lacquer coating

and Finishing

it is always easier to train operators to do a small unit process in exact accordance with a specification, so that when they see a specification number they automatically perform the job with precision and speed.

This system can also include electroplated coatings which are many times used in conjunction with lacquers. For instance, one may want a finish consisting of a copper coating on steel, which is then rubbed and sprayed with one or two coats of clear lacquer. The specification for this finish can be made up exactly as in the cases cited above. Special processes, such as rubbing the final coat of clear lacquer to a dull finish with pumice and water, can be introduced at will.

The reduction in the amount of records required, and the possibilities for reducing the number of materials required when using this system, present potential economies which cannot be overlooked.

Sample Color Panels Used As Aid to Uniformity

FOR purposes of control of color and general appearance of finishes as well as for reference, it is always of advantage to maintain a system of panels which illustrate the standards set for finishes which have been prepared in exact accordance with factory specifications. These panels should be prepared in such a manner as to illustrate tolerances of color variation, gloss and smoothness for use as standards of appearance by inspectors of finished products and for checking the finishing materials which may vary somewhat between lots. They are also of great assistance to the designer of new products when he selects the finishes to be used.

This is especially true when color harmony or color matching of individual parts are involved. There are many instances in production, where certain parts of an assembled unit can be finished with a cheaper finish than others, because they are not subject to wear. These parts must match the others in color or be of a color which harmonizes with the unit as a whole. With a flexible system of finishes, such as described previously, the selection of supplementary finishes can be made with ease and accuracy.

Making the Panels

Panels used for this purpose should not be smaller than 5 x 8 inches; smaller panels make it difficult to get a true picture of the finish. The panels can be filed conveniently in cabinets which have drawers fitted with light wooden frames into which padded slots have been cut. In this manner two rows of panels can be accommodated in each drawer, giving a capacity of from 50 to 75 panels per drawer. This method of filing gives the panels complete protection from light and misuse, and arranges them conveniently for reference.

To be of value, standard panels must be protected carefully from unnecessary exposure to light and misuse in handling. One set of these panels should be designated as master panels and filed away for use only in checking other panels which are in circulation for the use of inspectors and designers.

The circulating panels can be protected conveniently by enclosing them in a folding cardboard frame such as is used for photographs. These frames will protect the panels from finger smudging and unnecessary exposure to light while in use. When not in use, they should be stored in filing cabinets. When standards are protected in this fashion they will have a normal life of several years, which in this day of rapidly changing finishes is usually sufficient.

Improving Tin Plate by Electroplating with Tin

Following the British patent granted to Macnaughtan for reducing porosity in the tin coating on tin plates by electrodeposition, A. W. Hothersall and W. N. Brawshaw have examined different types of plating solutions and the effects of conditions of deposition, preparatory cleaning treatments, thickness of tin deposited, and of polishing after electrodeposition. The effect of bending the tin plate on the porosity of the coating, before and after plating, was investigated from the point of view of the practical value of the process, using the ferricyanide paper and hot water methods of testing.

Both acid and alkaline plating baths were tried and the tin plate samples were procured from five different Welsh tin plate manufacturers. The tin coatings deposited from acid baths were not effective in reducing porosity, but those from alkaline baths even in small thicknesses eliminated it entirely. The spangled iridescent appearance which results can be enhanced for decorative purposes by slightly etching the plates before treatment, or it can be removed by slight polishing without increasing the porosity. Porosity in bent plates could be greatly reduced by plating. The process appears likely to prove of value when applied to fabricated articles where coatings free from porosity are required.

An account of this work, which was carried out for the International Tin Research and Development council, has been published by the council as Technical Publication Series A, No. 22.

Copies of the paper may be obtained free of charge from the International Tin Research and Development Council, L. J. Tavener, United States representative, 149 Broadway, New York.

Fibers Sprayed Over Enamel

A new type of finish which closely resembles cloth stretched tightly over metal or wood is now on the market. It is produced by spraying cotton or rayon fibers (with a modified air gun) over a film of lacquer enamel of the new synthetic type, before it has had time to dry. It is available in several stock colors. This finish should largely replace the use of cloth backgrounds for many purposes because of its relatively low cost.

Remote Control and Pneumatic-Tired Drive Improve Overhead Handling

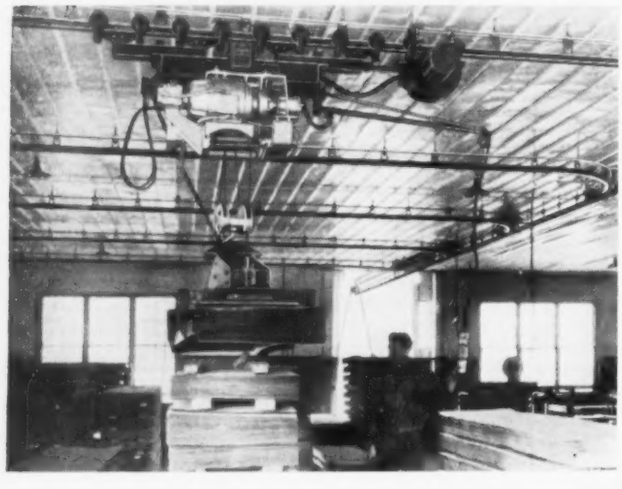
TWO important improvements recently have been developed by American MonoRail Co., Cleveland, and applied to its line of MonoTractors. They are of interest to companies having overhead handling problems.

One of these improvements involves the use of a drive wheel equipped with a pneumatic tire. The tire engages the bottom of the MonoRail. Because of the high friction coefficient between rubber and steel, this type drive has high tractive value. With such drives it is possible to move loads up and down grades with loads under perfect control in both directions. Grades up to 10 per cent are being negotiated successfully in a number of installations.

Route Set Automatically

The other improvement is the increased application of remote control. In one plant, for instance, the material is placed in a cradle suspended from an electric hoist propelled by a MonoTractor. The operator presses a button whereupon the hoist elevates the cradle with its load a distance of 30 feet. Limit switches then come into operation, stopping the action of the electric hoist and energizing the motor tractor. The latter then propels the load over a roof, and across an open court and into a processing room where limit switches stop the travel. The electric hoist lowers the load and the cradle empties itself. The hoist again raises the cradle and returns it to the starting point. The entire operation, including the return trip, is automatic.

Another application is in connection with handling of sheets. It consists of a motor tractor which propels an electric hoist from which an electrically operated grab is suspended. The latter is designed for picking up 3-ton bundles of sheets. Controls of the electric hoist, the motor tractor and the sheet grab are brought to a 6-button pushbutton station as shown in the accompanying illustration. This control is carried on a swivel arm which permits the operator to pass around three sides of the load, keeping entirely away from the load while in transit. The two center pushbuttons which control the electric sheet grab are guarded with a swinging shutter to prevent accidental contact.



Steel sheets, in 3-ton bundles, are picked up by an electrically operated grab. This is operated by a MonoTractor equipped electric hoist. All movements are accomplished by remote control

Metal Finishing Processes, Problems Are Surveyed

Finishing Metal Products, by Herbert R. Simonds; cloth, 337 pages, 6 by 9 inches, 147 illustrations; published by McGraw-Hill Book Co., New York; supplied by STEEL, Cleveland, for $3.50, plus 15 cents for postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

Importance of the finish of metal products has increased greatly in recent years, from the point of view both of sales and manufacturing economy. In this volume, the author, formerly an associate editor of STEEL, gives the plant executive and his assistants all down the line to the finishing room foremen, information from which may be determined the best kind of finish for a specific product and the best technique for producing this finish.

The book comprises 29 chapters, and is divided in six parts—commercial aspects of finish and appearance; preparation for the finish of metal products; polishing and buffing; plating and spray coating; painting, and special finishes.

Mr. Simonds appears to have covered the varied aspects of finishing metals fairly completely, and in addition gives the reader valuable comments of a number of manufacturers who have had experience with different types of finishing methods and materials.

The subject of this volume is one which ties in closely with STEEL's department, "Surface Treatment and Finishing," which appears on pages 32 and 33 of this issue, and which from week to week will present details on this subject in comprehensive style.

Mechanism of Brass Plating

(*Concluded from Page* 31)

and 0.1-gram phenolphthalein in 300 cubic centimeters of 50 per cent ethyl alcohol[2].

As in other baths, the concentration of the solution may change without any additions being made. This is largely due to the fact that these anodic and cathodic current efficiencies are not 100 per cent[3]. If the anode efficiency is less than 100 per cent, which is always the case, the current which is not used to dissolve the brass anode oxidizes the cyanide to cyanate. The cyanate thus formed is converted to the carbonate (carbonic acid from the air) or other compounds, and, as has been pointed out, the solution has a tendency to deposit more copper and less zinc. If the cathode efficiency is less than 100 per cent, hydrogen is evolved, the bath contains more hydroxyl ions, the solution becomes more alkaline and again the composition of the bath changes, which, in turn, changes the composition (more zinc) of the alloy which is deposited.

Several investigators[4] have endeavored to perfect methods whereby the concentration of a brass plating solution may be kept constant as to composition. Each time the investigators have come to the conclusion that the cathode and anode efficiencies should be as high as possible and equal to each other. There are going to be some changes taking place in the bath, and the only way to detect these is by chemical analysis. Therefore, all baths should be analyzed periodically and corrections made. In this way a plant will always produce a uniform deposit of brass on the part to be plated.

[2] Blum and Hogaboom. "Principles of Electroplating and Electroforming." (McGraw-Hill) p. 383 (1930).

[3] C. B. Young. "Current Efficiencies," STEEL, Vol. 95, No. 21, Nov. 10, 1934, pp. 38 and 51.

[4] M. Thompson. "Brass Polishing." *Metal Cleaning and Finishing*, Vol. 6, No. 9, September, 1934, pp. 449-452.

POWER DRIVES

What Would You Do?

SOMETIMES it pays to underpower a drive as a safety feature. For example, in a midwestern foundry a conveyor handling molding sand frequently stuck, as when a gagger or other piece of metal jammed and stopped the conveyor. As the motor was amply powered for the drive something had to give; consequently the 10-inch belt driving on 30-foot centers would be burned.

Replacing the entire belt cost over $100, not including the labor and interruption to production. In one day five such stoppages occurred, causing a direct replacement expense of several hundred dollars. The foundry always carried a large supply of belting for replacement because the jams and stoppages were apparently unavoidable.

The solution adopted was to use multiple V-belts on a short center drive with a rating sufficient to carry the starting load but not powered high enough to carry a heavy overload. Now, when the conveyor jams, the belts still are ruined but as they cost only a fraction of the former drive the expense is greatly reduced.

In both drives the belts serve as a safety fuse and their failure prevents seriously damaging more valuable equipment.

Perhaps there may be a better way of solving this drive problem. What have you done, or what would you do, in a case like this? Your experience or suggestions might prove helpful. Send them in!

• • •

Hotsaw Drive

OFTEN one of the most troublesome drives in a steel mill is on the hotsaw. Peak loads amounting to 100 per cent or more of the motor rating, shock, and perhaps some crowding of the saw put a terrific load on any belt. Belt life, therefore is ordinarily expected to be comparatively short.

However, only a few months ago a special belt connecting a 300-horsepower motor to a hotsaw was replaced with a new duplicate after over six years of satisfactory service. This 28-inch belt drives from a 26-inch diameter, 30-inch face motor pulley operating at 720 revolutions per minute to a 15-inch diameter, 30-inch face driven pulley on approximately 15-foot centers.

Such drives require a belt of high strength, practically free from stretch, but with a tight gripping surface which will pull without slipping, because slippage results in burning and short life as well as in decreased production. This special belt consists of a strong fabric base material which is faced on the driving side with pliable strips of special tannage leather, thus combining strength with a good tractive or driving surface.

When installed, the best expectation of life was between two and three years so that the resulting six years represented a ripe old age. Severe service such as this requires more than the ordinary equipment. With such service records considerable additional initial expense can be economically incurred in the long run.

The additional factors less maintenance cost and less time out for servicing which accompany long life and satisfactory service, would materially increase this economic advantage.

• • •

Inviting Another Failure

WHENEVER a drive fails it is because something is wrong," stated the master mechanic of a medium sized midwestern plant recently to a representative of STEEL. "Putting the drive back as it was before the failure simply invites another breakdown.

"Of course in emergencies quick replacements are necessary and often this means duplicating the existing installation at least temporarily. However, such failures are studied and the weak parts strengthened at the first opportunity.

"In this particular plant the most trouble was in the motors on the conveyor drives, which were entirely unsuited to frequent starting under heavy load. From a careful study of methods of improving the coils and insulation the time between rewinding was more than doubled. In a number of cases the framework for supporting the motor and the driven pulley was too weak and broke or sprung. It was repaired by welding in braces or by mounting the motor and speed reducer on a concrete base. Some belt drives which were entirely too light were replaced by chain where the proper size of belt could not be inserted in the available space.

"Wherever finances permitted, the most offending troublemakers were replaced with equipment designed for such severe service, but as the plant had been taken over by new management such steps were necessarily gradual. Also a careful study of the troubles as they came up indicated weak points of the equipment which had to be strengthened in the new installations. If sufficient funds had been available at the start to rehabilitate the drives in the entire plant undoubtedly much of the new installation might have been put in but little better than the old because we would not have known what was wrong."

Snap judgment on drives is often costly.

• • •

Lengthening Centers

WHERE the driving pulley, sheave, or pinion is below on a vertical drive, a slight amount of wear or looseness affects the life or efficiency of the drive. Angles less than 45 degrees from the horizontal should be avoided if possible or the size of the drive belt or chain increased to compensate for the reduced transmission capacity.

In one plant the center distances on a number of chain drives were increased from 2 feet to 4 feet so that the motor could be set farther to the side and so decrease the steep angle of the center line of the drive from the vertical. The engineer believed that this not only would increase chain and tooth life but also would decrease maintenance.

The same idea of lengthening centers slightly could be adopted to advantage on many short centered vertical belt drives. This would not only decrease the angle of inclination but also increase the arc of contact on the smaller pulley. Short centers can be overdone.

• • •

Antifriction bearings not only simplify lubrication but are a safety feature as well, because of their less frequent exposure.

• • •

Most belt trouble results from incorrect lacing; not cutting the ends square is a common mistake.

• • •

Nothing may be wrong with drives which fail except that they are not suited or intended for the work required of them. A race horse is poor economy at the plow as is a draft horse on the track.

METHODS AND MATERIALS

Radiant Tube Firing Is Applied to Enamel Furnace

Several months ago a large manufacturer of stoves and heating appliances converted one of its six gas-fired, box-type muffle porcelain enamel burning furnaces to radiant tube firing. Results obtained have been gratifying both from a production and economical standpoint. The work performed is said to be equal quality, if not better, than that obtained from a full muffle furnace. The more lustrous gloss produced in the radiant tube furnace is attributable to the strictly oxidizing furnace atmosphere which is at all time free from harmful gases.

As the heating agent for porcelain enameling, the radiant tubes are claimed to not only be practical but basically economical because of the high radiant heat emmissivity of internally-fired alloy tubes and the proximity of the work to the source of heat. Maximum temperatures inside of the tube wall do not exceed 1850 degrees Fahr. to produce a furnace or outside temperature of 1600 degrees Fahr.

s s s

Hard Facing Welding Rod Contains Tungsten Carbide

Haynes Stellite Co., 30 East Forty-second street, New York, has developed a new hard facing welding rod known as Tube Haystellite. It consists of a hollow steel rod the center of which contains crushed and screened tungsten carbide particles. It was developed to meet the demand for an inexpensive rod for hard surfacing parts on which roughness of surface contour is permissible but where extreme abrasion resistance is required. Although intended primarily for use on oil well bits, the rod already has met with widespread use in the excavating, dredging and mining industries.

s s s

Carbon-Free Nickel Best Suited for Spinning Work

Carbon-free nickel offers marked advantages over regular nickel and Monel metal in spinning, in that it is softer, more ductile, and lower in strength. Most shapes may be completed without annealing, and when annealing is necessary good results may be obtained with open gas or oil torches. Regular nickel and Monel metal usually require a type of furnace equipment not found in most spinning shops.

An initial soft temper suitable for spinning is obtained in carbon-free nickel sheet without sacrificing small grain size, and consequently "orange

Big Dipper in Steel

THIS 18-yard dipper, with renewable lip, is entirely of manganese steel castings, except the bail which is all-welded high-tensile steel. Shipped recently to Maumee Collieries Co., Terre Haute, Ind., by the American Manganese Steel Co., Chicago Heights, Ill., for use in stripping over-burden from coal fields, the dipper weighs 48,850 pounds, replacing a 14-yard dipper weighing 59,000 pounds. Overall width is 9 feet 6 inches; depth, 9 feet 5 inches; height varies from 7 feet 3½ inches in back to 11 feet 6 inches in front. These are outside dimensions

peel" surface does not develop as with the large grain stronger metals when over-annealing is done in attempts to soften them to come within the capabilities of the spinner.

S S S

Automobile Plant Regulates Temperature in Its Shops

For the first time in the history of automobile manufacturing, temperature regulation and air conditioning are being installed in machine shops of the Ford Motor Co., Dearborn, Mich. In the cylinder lapping room, temperature regulation was undertaken because there was a variation in the size of cylinder blocks, depending upon whether the day was very hot or cool. This variation was enough to cause an engineering problem.

It is planned to extend the use of controlled temperature to rooms where cylinder blocks are bored and to those departments where crankshafts, camshafts, pistons and flywheels are finished.

Temperature regulation also is being applied in the roll grinding shop serving the new continuous broad strip mill.

New Machine Cuts Metallic Strip and Cold-Rolled Sections to 0.005-Inch

ACCURATE cutting to length of metallic strip and of sections produced by the cold roll forming method, is accomplished by a new automatic cutoff of the flying shear type, developed by the Yoder Co., Cleveland. This machine is shown in the accompanying illustration. The cut length does not vary more than plus or minus 0.005-inch on many of the units now in daily service. It is possible to cut pieces 3 inches long and up, the minimum length being dependent upon metal speed. On certain sizes of the cutoff units metal speeds up to 500 feet per minute may be accomodated. An accompanying illustration also shows representative sections which are cut to length with this machine.

Two of the new cutoff units may be synchronized, one at the entering side and the other at the delivery side of the roll forming machine, in order to produce notched and cut to length sections. Installation of this machine eliminates the need for a long runout table on the delivery end of the cold roll forming mill and subsequent cut to length operations. As a result, floor space is saved and direct labor lessened, so that the machine pays for itself out of savings within a comparatively short period.

Operation is automatic. Length is controlled by a flag switch which, when tripped, releases the cutoff die mechanism. The die is mounted on a cam actuated table that is moved at the same speed as the moving section. The machine is made in various sizes and in addition to narrow, flat and formed sections, may be applied to flat strip service.

Investigate Mill Bearing Pressures

ROLLING mill bearing pressures, wear and lubrication, were considered at one session during the recent annual meeting of the American Society of Mechanical Engineers held in New York, Dec. 2-6. Three papers were presented at this session.

Information offering a logical reason for the tremendous unit pressures carried by bearings, such as those employed in rolling mills, was contained in a paper prepared by J. R. Connelly, Lehigh university, Bethlehem, Pa., and C. C. Hertel, Paulton Silk Corp., Berwick, Pa. From results of tests carried out during a bearing investigation by the varying wear method, it is believed that the viscosity of mineral oil increases with bearing pressure.

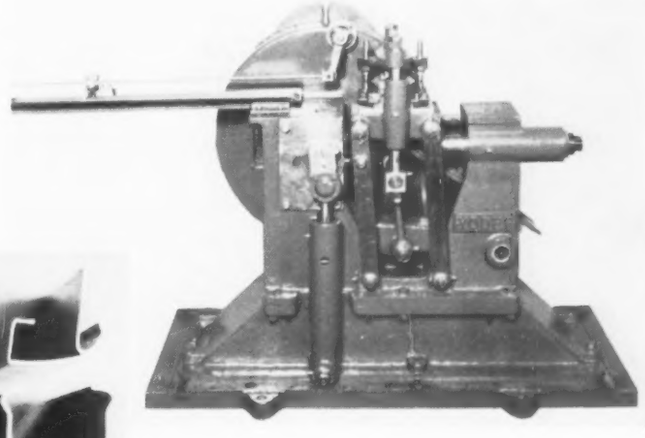
Assuming that the ability of an oil to prevent metallic contact varies with the viscosity, the high unit pressures involved in roll neck bearings would account in some measure, the co-authors of the paper believe, for their ability to stand up under the excessively heavy loads.

Review Methods of Control

In two subsequent papers, the matter of control of bearing pressures in roll necks was discussed. Pressure blocks of the expansion type were covered by F. Buckingham, Baldwin-Southwark Corp., Philadelphia, these being arranged, with particular success on large mills, to translate pressure into electromagnetic quantities which permit remote recording through the medium of electric meters. Damage to bearings and housings by overloading thus is prevented. The pressure blocks discussed also may be utilized as strain gages for measuring deformation in the mill structure. In such an application, the gage is calibrated in pounds under standardized loading, this giving a means for determining rolling loads.

The other device for measuring and controlling bearing pressures was of the recording extensometer type, this being described in detail by M. Stone, United Engineering & Foundry Co., Pittsburgh. Similar results and determinations are obtain-

THIS machine cuts lengths 3 inches long and longer and at rates up to 500 feet per minute. Below are shown some of the cold rolled sections cut by this machine on a production basis



able as with the pressure block system, both being described by S. Weckstein, Timken Roller Bearing Co., Canton, O., in later discussion, not only as refinements to mills but essentially newly developed methods. Mr. Weckstein brought out that their value is especially significant when it is recalled that ineffective pressures in mills often exceed 50 per cent.

Influence of holes in test bars on the behavior of Bakelite when used for photoelastic tests was covered by M. M. Frocht, Carnegie Institute of Technology, Pittsburgh, at a session on applied mechanics. Best results were obtained when copper pins were used, with a press fit of 0.001 to 0.0015-inch for ¼-inch holes. Fractures occur at different places in the bars, but chiefly at the holes if clearance is permitted between holes and pins. This is believed to be due to distortion in the hole, with consequent concentration of stress at that point.

Advantages of Marblette for photoelastic test models were emphasized in a later paper by A. G. Solakian, Columbia university, New York. This is a phenolic material having a high streso-optical coefficient, which the author believes will replace many of the other materials used in the study of stresses by polarized light. Among its other assets are machinability and perfect homogeneity.

Manufacture of Fare Boxes Provides Outlet for 150 Tons of Steel Annually

FARE boxes steadily have been replacing the manual system of collecting coins or tokens from patrons of street railways and bus lines. A few of the larger cities still retain the old method, but the use of the box has speeded up service, promoted safety and made possible more accurate checking of receipts and number of passengers being carried.

Manufacture of this equipment has resulted in a growing market for steel as well as various nonferrous metals, steel consumption alone for this purpose being estimated at more than 150 tons annually.

Several different types of fare boxes are available. Three are shown in the accompanying illustration, by courtesy of Johnson Fare Box Co., Chicago. The simplest serves merely as a collector. It consists of two compartments, the upper one being fitted with plate glass walls and having an opening to receive the fare. This section of the box illustrated is fabricated of aluminum. Interior chutes, designed to prevent the extraction of fares by overturning the box, also are made of aluminum. A brass handle is operated to tilt the floor of the top section which drops the coins into the cash box below.

The cash box is formed from 16-gage cold-rolled steel and fits into the lower cabinet section which is fabricated from similar material. A special lock fastens the cabinet door. While opening this door gives access to the cash box, a double lock is provided in certain types. In this design removal of the cash box, the top of which is open during the deposit of fares, causes it to be locked automatically. It may then be transported to the counting room where it is unlocked.

These fare boxes are made in several sizes, ranging from 25 to 33 inches high and weighing from 24 to 34 pounds. Roughly one-fifth of this weight consists of steel parts.

Automatic Type Developed

A recent development in registering fare boxes is the entirely automatic type which also incorporates a visible and audible overhead registration of the fares collected and requires no action on the part of the operator. In this type an overhead register is installed in a fixed position in either end of the street car or bus. The fare box has a magnetic coil connected in series with a similar coil in the register. When a fare is deposited it bridges two open contact points, operating a magnet in the overhead register and indicating on the dial the fare and number of passengers. Indicating dials also are located on the fare box.

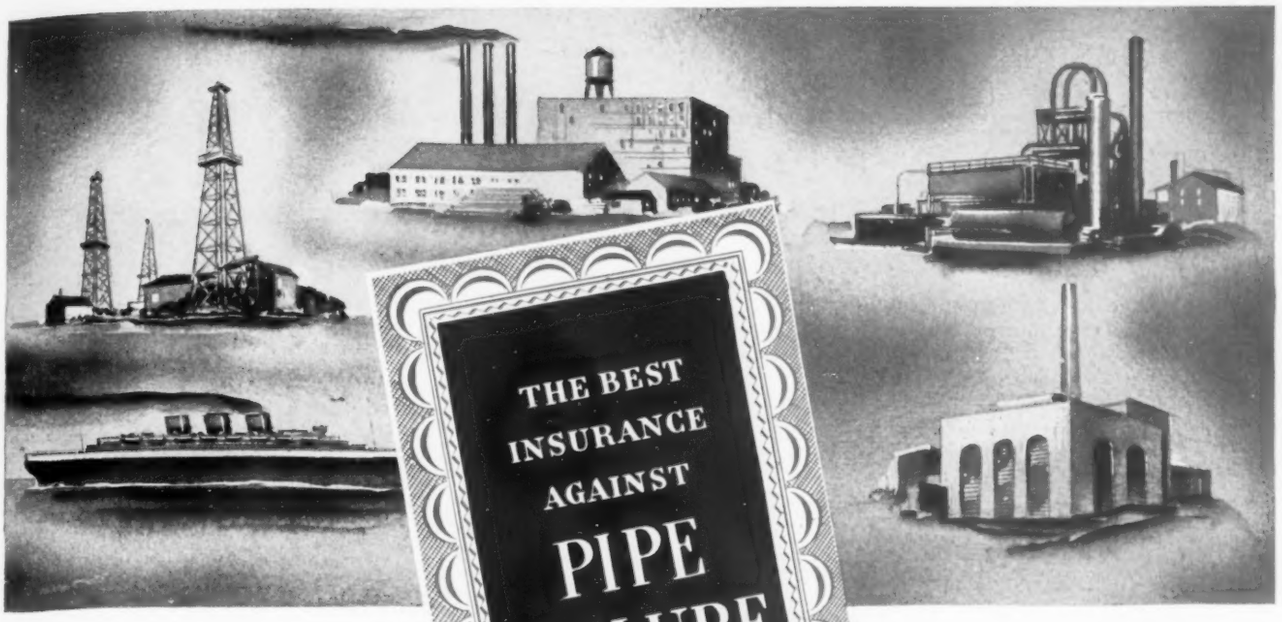
After passing over an inspection plate, the fare drops into a coin return chamber where it is available to the operator for changemaking or resale purposes. The fare box itself is relatively small, weighing about 15 pounds. Coins or tokens are introduced through a slot instead of through a large mouth as in the case of other boxes. The case is an aluminum die casting, chromium plated, while the bottom plate is a steel forging.

Pedestals for mounting the automatic type of fare box generally are made of iron or steel, being either a casting or a rolled pipe section with a malleable iron base.

Common type of registering fare box (right, in the illustration) is intended to keep a record of the number of fares paid. Coins or tokens drop into the glass-enclosed partition, then fall into the mechanism below where they are sorted and registered on an exposed dial or dials.

The upper compartment of this unit is made of copper and die cast aluminum, while the lower cabinet is formed from cold-rolled steel. Several parts of the interior mechanism are steel and are cadmium plated.

Three types of fare boxes—from left to right, collector type, automatic registering type, and common sorting and registering type. Steel, aluminum and brass are the chief metals used in their construction



No one objects to paying 25 cents for a half-dozen razor blades, even though it is common knowledge that the steel in those blades costs in ingot form only an infinitesimal fraction of a cent. Why?

Those blades do what the steel in the ingot could not do before work was done on it. You pay for the service the steel has been processed to do.

It's the same with Toncan Iron Pipe. Open hearth iron has been alloyed with copper and molybdenum and processed to resist corrosion—and it does to a greater degree than any other ferrous material in its price class. Naturally, it costs more than ordinary pipe, but don't figure it that way. Figure the slight additional cost of the pipe itself as insurance against pipe failure. Then you will quickly realize how slight a premium you are paying for long dependable service—how little you are paying to cut down repair and replacement expense. And don't forget that it costs more to tear out failed pipe and replace it with new than it costs to make the original pipe installation. So the smart thing to do is to install Toncan Copper Molybdenum Iron Pipe in the first place and save money.

REG U S PAT OFF
TONCAN
COPPER
MO·LYB·DEN·UM
IRON PIPE

Republic Steel
CORPORATION
GENERAL OFFICES · · · YOUNGSTOWN, OHIO

Training Key Men Subject of Report

GROWING attention given to employer-employe relations has focussed attention on foremen and other supervisory employes because of their key position between management and the rank and file of the organization. This explains why, according to a report recently issued by the Policyholders Service bureau of the Metropolitan Life Insurance Co., increasing emphasis is being placed on the training of such supervisors as foremen and the other "noncommissioned officers" of managerial staffs. A report of the survey, entitled *Training Supervisors and Key-Men*, presents an outline of the practices of 85 companies that have inaugurated such employe training programs.

A clearly defined purpose is essential to the success of training programs, the report points out. Analysis of the training methods of the 85 companies shows that there are three predominating objectives: (1) Providing foremen with an opportunity to acquire information; (2) helping them to think clearly about their jobs, and (3) developing ability in doing what is required of them. Methods of training discussed in the report vary from the studied informality of the "conference" method to schedules of lectures on such subjects as economics, psychology, time study and cost accounting, also on company organization and history, products and markets, plant policies and practices. The report, referring to discussions used in connection with training lectures, states that it has been found that information acquired through such methods is better understood and more readily accepted.

What Makes Program Success?

The essentials for success in a program of foreman training, according to information in the report, are active interest from the management, a competent leader, a carefully selected group, practical subjects for discussion. The report states that there is difference of opinion as to the possibility of measuring results of training programs. Some companies however, point to specific improvements in departmental production, to changes in attitude of certain foremen, or to the fact that trained foremen have developed faster as a group than those who have not received training.

The report also discusses methods of planning a training program, and the costs of a training program. The details of the practices of seven companies are outlined at some length. Copies of this report are available on request to the Policyholders Service bureau, Metropolitan Life Insurance Co., 1 Madison avenue, New York.

WELDING, et cetera . . .

BY ROBERT E. KINKEAD

IN THIS column, the author, well-known consulting engineer in welding, is given wide latitude in presenting his views. They do not neeessarily coincide with those of the editors of STEEL.

Other Side of the Hill

HARVARD university scientists in recent tests seem to have proved a long cherished theory of the welding fraternity, namely, that we could make a cold weld if we had enough pressure. We are not concerned with the fact that it required $100,000 worth of equipment to do a nickel's worth of welding. Exploration of the behavior of matter at high pressures and low temperatures represents abstract science in research at its best.

No doubt Prof. Bridgman, who directed the experiments, was little concerned as to whether he would prove or disprove any theories of the welding fraternity. Like all true scientists, he wanted to see what was around on the other side of the hill. In doing so he has created waves and ripples of thought in the minds of thousands of other men all over the technical world. Such work is of immeasurable value and significance.

We have often wondered which would produce the greatest good, for the government to give a man like Prof. Bridgman a million dollars to do with as he pleases, or to give a million men on the street a dollar apiece to do with as they please. But then, of course, Mr. Roosevelt really has given Rexford Tugwell about 250 million dollars to do with as he pleases. It is all very much of a mystery to us.

* * *

Rate of Rate Change

IN WELDING, as in other technical processes, it is well to consider heavy investment in equipment in relation to the probability of early change in methods which might make the equipment obsolete. Building up an investment of several milion dollars in equipment without reference to trends in welding and the threat of wholly new processes is a good way to invite painful disappointment.

The case of lap welded pipe illustrates the point. While many millions of dollars invested in this equipment is only obsolescent at the present moment, it has little likelihood of becoming anything but completely obsolete in the future. Present welding methods are changing at least five times as fast as when lap welded pipe equipment was installed.

While administrators of invested capital have heretofore had to deal with the rate at which change occurs in technical processes, they are now confronted with the necessity of dealing with the rate at which the rate of technical progress changes. Dealing formerly with a factor analogous to velocity, they now must deal with acceleration.

If we may carry the analogy one step further, we would suggest that failure to deal realistically with the subject of accelerated technical progress in the welding field might result in first hand knowledge of the laws of falling bodies on the part of administrators of invested capital.

* * *

Applying Experience

MANY able and experienced industrial managers lament there are not enough able and experienced engineers available in welding. There is a great deal of misunderstanding of the needs in this connection. No one expert in welding should come into an organization and turn things upside down by application of welding. It is sane, sensible and profitable to have an experienced welding man advise and assist the men who know their jobs in the matter of solving some of their problems with welding. Given good advice, the men who are on the job will make extremely rapid and effective use of welding.

Photo courtesy of Fruehauf Trailer Co., Inc., Detroit, Mich.

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Designs New Checker for Regenerator Chambers

BY M. K. MELLOTT

NEED for greater efficiency in the regenerator chambers of open-hearth furnaces has resulted in the design of a new open-hearth checker brick, known as the Superior. In designing this checker, consideration was given to several features, acknowledged to be important in obtaining maximum efficiency in regenerator operation, i.e., larger heating surface, increased flue area, sufficient structural strength, ease in cleaning, and increased volume of combustion air through the checker chamber.

The checker is made for any standard size flue, with a brick depth of 2½ or 3 inches, and a thickness as close to 2 inches as commercially practical.

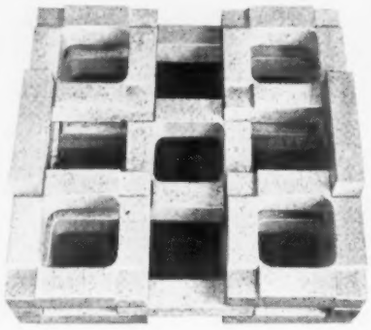


Fig. 1—Each checker is interlocked at all four corners

Checkers Are Interlocked

In laying up the Superior checker in a chamber, each checker is interlocked with adjoining checkers at all four corners, as shown in Fig. 1, and each course of checkers is locked into the adjoining course, thereby preventing shifting or twisting and the obstruction of the flues.

Studies of regenerator efficiency prove the importance of exposed heating surface in the checker brick. Acknowledgement was given to this feature in designing the new checker. However, since the free downward area per horizontal checker area is of equal importance, the designer endeavored to obtain a free area of approximately 50 per cent, even though, with certain brick sizes it meant the sacrifice of some exposed heating surface.

Results obtained in producing maximum heating surface and free area with the new checker design, as compared to standard 9 x 4½ x 2½ inch bricks are shown in the accompanying table. The standard brick laid up to form a 6 x 6-inch flue shows 4.70 square feet of heating surface per cubic foot of space, and 33 per cent of free area. The new checker, with the same size flue, shows 5.564 square feet of heating surface per cubic foot of space, and 52½ per cent of free area, or an increase of 18 per cent in heating of surface, and 60 per cent of free area, or actual flue area per cross section. In another case, a standard 9 x 4½ x 2½ inch brick laid up to form a 5 x 5 inch flue, shows 5.00 square feet of heating surface, but only 28 per cent of free area, whereas, the new checker with a 5 x 5-inch flue gave 6.15 square feet of heating surface with 48.9 per cent free area, or an increase of 75 per cent in free area and 23 per cent in heating surface.

The large free horizontal area obtained with the new checker offers a minimum of resistance to the passage of combustion air through the checkers, thus assuring an increase in the quantity of this primary air, correcting in a major degree, one of the weakest points in open-hearth furnace operation.

The Superior checker, which recently was placed on the market by the William M. Bailey Co., Pittsburgh, was used in relining one of the open hearths of an eastern steelmaker and will be used in two additional furnaces at other plants.

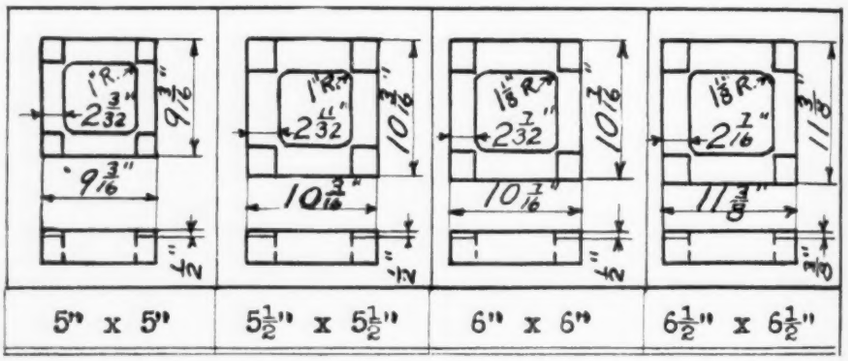


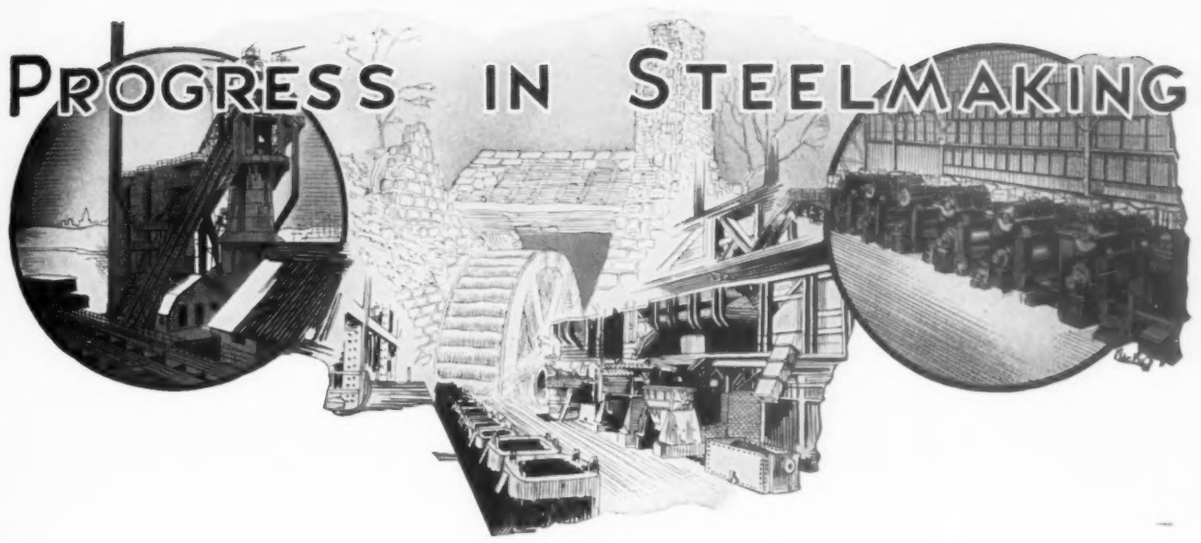
Fig. 2.—Overall dimensions of four standard size checkers of new design

Uses of Lignum-Vitae

"The Industrial Uses of Lignum-Vitae, Champion of the Hard Woods" is the title of a book to be issued shortly by Lignum-Vitae Products Corp., Jersey City, N. J., which has specialized in fabricating lignum-vitae products since 1890. Copies will be sent to mechanical, engineering and production officials, upon request, without cost.

Comparative Data on Open-Hearth Checkers

Size of Flue	5 x 5 Inches			6 x 6 Inches				
Size of Brick	9x4½x2½" flat	Superior 2½" deep 2½" walls	Checkers 3" deep 2½" walls	9x4½x2½" flat	Superior 2½" deep 2½" walls	9x4½x3" edge	Superior 3" deep 2½" walls	10½x4½x4½"
9-inch equivalent	1.00	1.49	1.80	1.00	1.84	1.28	2.23	2.24
No. of bricks per cu. ft.	7.66	4.29	3.43	6.27	3.20	4.74	2.56	3.48
Weight of bricks per cu. ft., pounds	57.5	48.0	46.4	47.0	44.1	45.5	42.8	58.4
Free downward area per horizontal checker area, per cent	28	48.9	49.3	33	52.5	44	52.7	33
Sq. ft. of effective heating surface per cubic foot	5.00	6.15	5.59	4.70	5.56	3.85	4.93	3.59
Sq. ft. of heating surface in 5544 cu. ft. checker volume	27,720	34,096	30,991	26,057	30,825	21,344	27,332	19,900
Increase in flue area over standard brick, per cent	....	75	76	....	60	←	20 60	→
Increase in heating surface over standard brick, per cent	....	23	11	....	18	←	28 47.4	→



Small Flues Recommended

Thermal investigation of soaking pits at a steelworks in the Pittsburgh district before and after insulation was applied discloses that no advantage is gained by using heavier insulation on the foundation than is installed in other parts of the pit. The ground causes the stored-up heat to offset the savings otherwise afforded by heavier insulation. While the same thickness of insulation should be used on the foundation as on the side walls of the checker chambers, refractory engineers recommended the installation of small recirculating flues between the concrete foundation and insulating material.

• • •

Calibration Is Essential

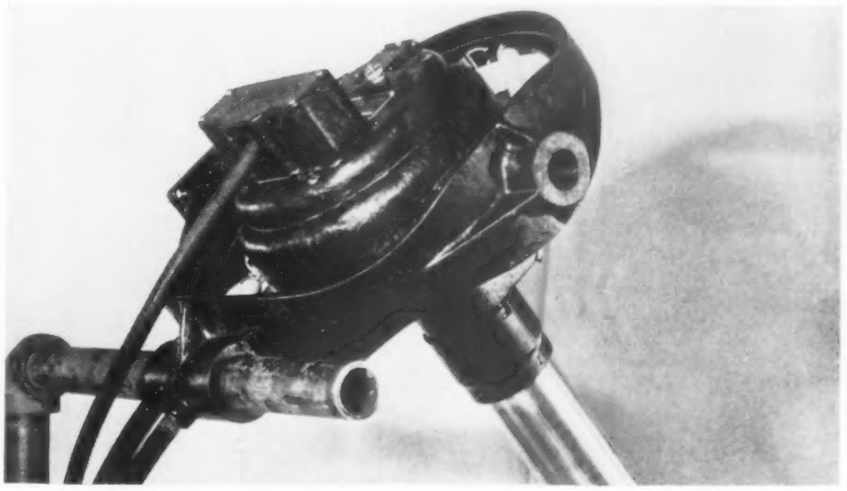
Optical pyrometers used in open-hearth shops should be checked from time to time against suitable standards and the necessary adjustments made, according to an authority on instruments. A checking instrument should be maintained in the laboratory as a secondary standard. Heat recording instruments used in plant routine periodically are checked against the standard unit using a flat filament lamp or a small furnace as a source of heat. The ammeters may be checked independently against a standard potentiometer. By following this procedure the calibrations of one laboratory should agree with those of other laboratories.

• • •

Prevents Surface Marks

Hot strip is being transferred from the roughing to the finishing stands at a plant in this country by a roller table driven by two planer-type motors. Operation of the table rollers is in one direction mostly but when the rolls are being cleared of obstructions the motors reverse the direction of motion repeatedly. The motors are plugged with 150 per cent current for full speed, operate a few revolutions in one direction, again plugged with 150 per cent current, and run a few revolutions in the opposite direction. This arrangement prevents the strip from becoming marked which otherwise would occur if it were allowed to remain in a stationary position on the rolls of the conveyor table. The motors have a rating of 50 horsepower continuous duty over the entire range of speed which may be varied from 250 to 1000 revolutions per minute.

Measures Temperature of Steel in Motion



TEMPERATURE of slabs, billets, bars, sheets, strip, rails, rods, tubes, etc. now can be measured without retarding rolling operations or production by the use of a newly developed automatic optical pyrometer. The instrument comprises a water-cooled telescope, or sighting element, that scans the hot steel, the temperature of which it is desired to measure; a power supply and amplifier unit; and, a recorder or indicator, or both. Application of the unit to hot strip mills enables the holding of reheating furnaces at the same temperature; affords the best temperature for removal of scale; permits the duplication of rolling schedules for different gages and sizes; prevents the accumulation of rejects by revealing faulty processing in the early stages of reduction; and, makes possible a permanent temperature record of mill output. The instrument, which indicates or records to full scale the temperature of a hot body in less than one-half second, was developed by the Minneapolis-Honeywell Regulator Co., Minneapolis, and the Brown Instrument Co., Philadelphia, in collaboration with steel mill engineers

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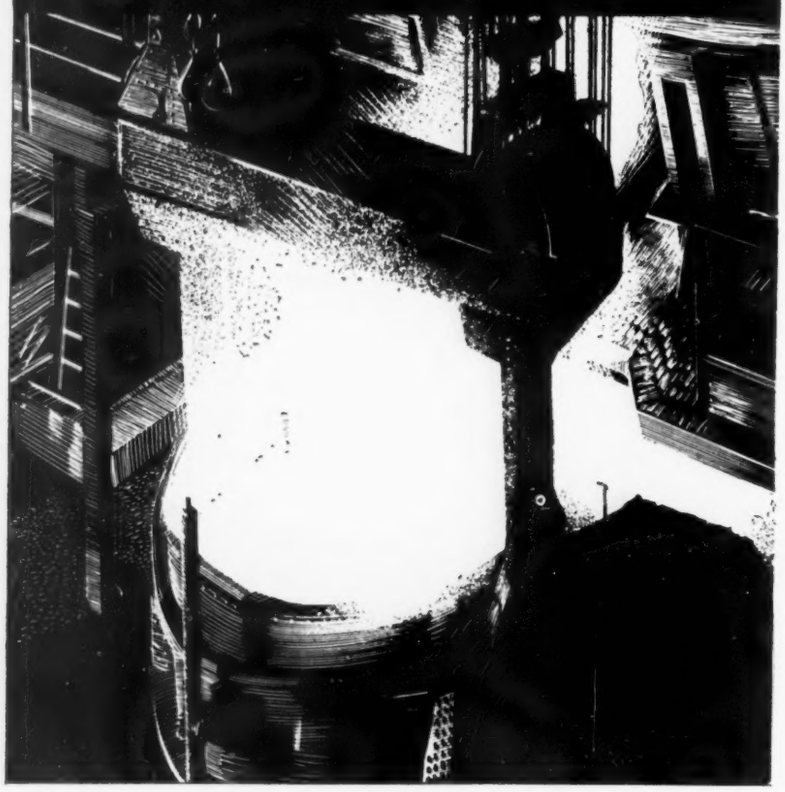
for every purpose



THE basis of the consistently successful performance of Timken Alloy Steels is the selection of correct analyses for specific purposes.

Timken technicians are able to make this selection with certainty because they possess a thorough understanding of service conditions and fabricating requirements from the user's viewpoint.

The size and shape of sections; the weight they will be called upon to carry; shock and wear-resistance necessary; heat treating and machining requirements; all are carefully considered and their relative importance accurately determined.

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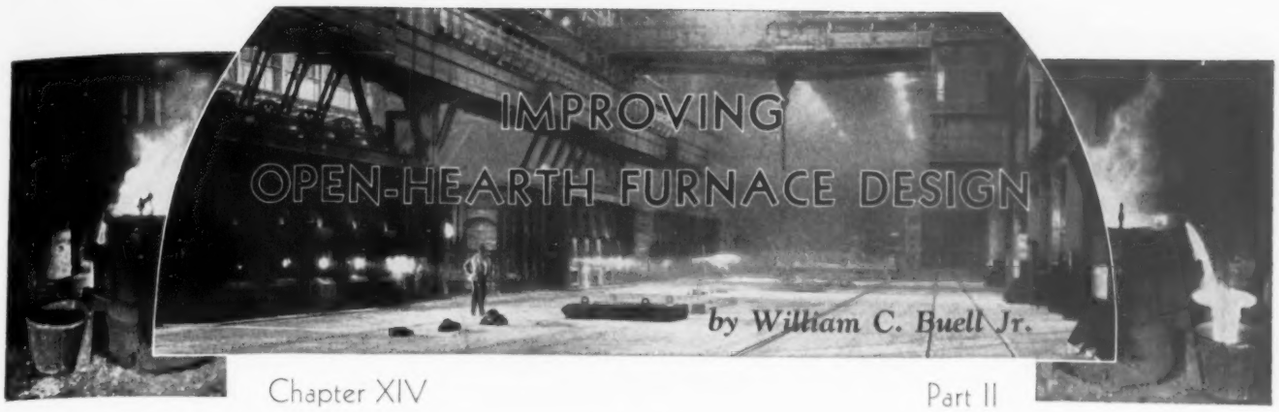

Chapter XIV Part II

Summary

FLOW diagrams drawn from the data of fluid velocity afford a visual comparison of furnace design and operation. While the method of their construction is fairly obvious reference is made to the method of their detailed construction which is explained in Volume 2 (to be published later).

The diagrams of the fluid flow in the ancillary system of the typical furnaces are presented in Figs. 206 to 209, and are interesting as demonstrating the clearness with which defects of design are emphasized and also as to what extent redesign is necessary to remove the defects.

How To Read the Charts

In the diagrams the dotted lines indicate the maximum velocity for ideal flow, and it therefore follows that under no circumstances should any of the lines of operation extend above the ideal lines. The influent system is at the left and with preheated gas practice the solid line represents the velocity of the fuel gas, while the dot-dash line represents the flow of the air. On the effluent system at the right the solid line with paired arrowheads represents the velocity of the furnace gas through the gas regenerator system, the dot-dash line the flow of the furnace gas through the air regenerator system, while the solid line with the tripple arrowheads represents the velocity of the entire or combined furnace gas from the process. In constructing flow diagrams it is advisable to lay the several components out to a horizontal scale of length and so prevent the linear distortion of velocity effects. On account of the ensuing small size of the reproduction if the length scale was incorporated it is omitted in the diagram presented.

It should be noted especially that the velocities through the slag pockets, in every case much lower in the furnaces than the ideal, is calculated as with the opening to the fantail A_{10} entirely clear. As the slag pocket fills the velocity line will

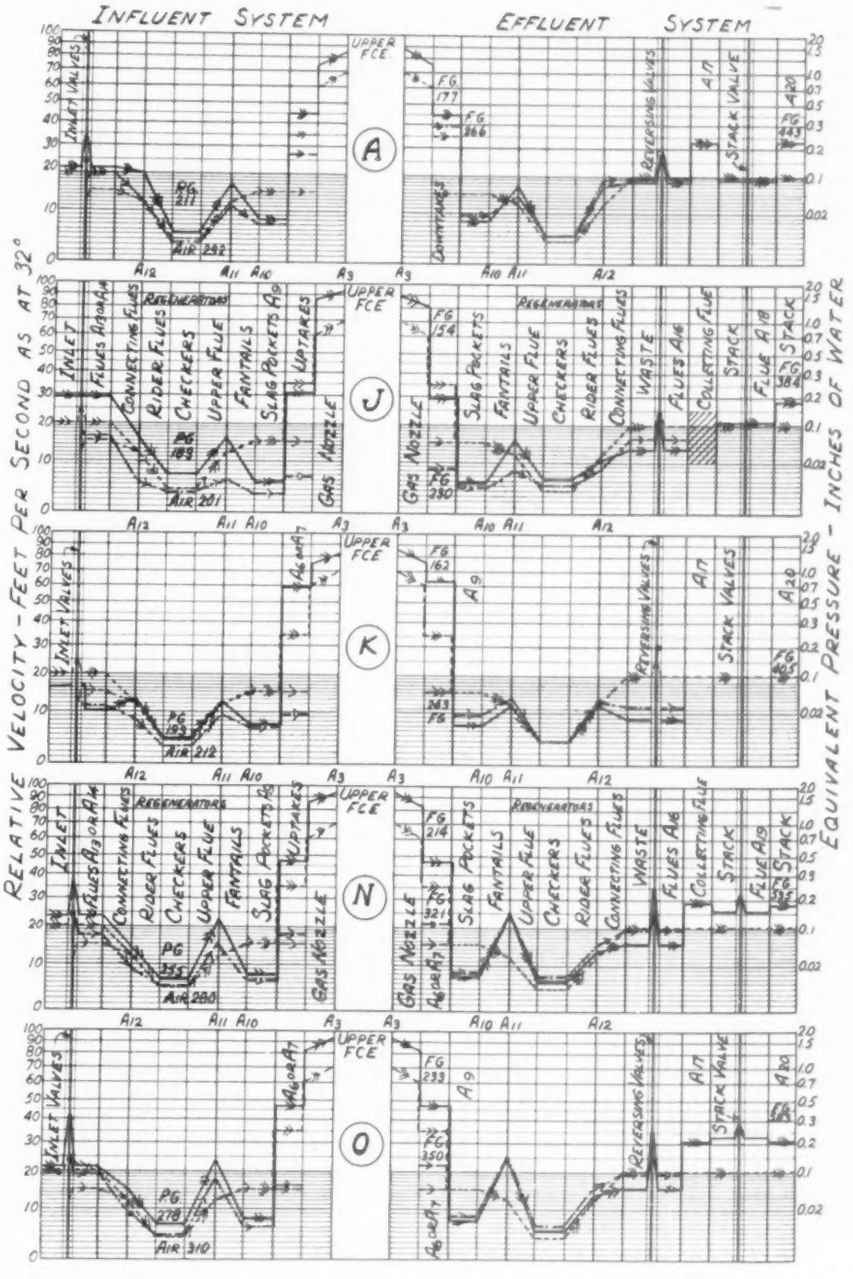

Fig. 206—Flow diagrams—ancillary systems—Group A, producer gas fired furnaces

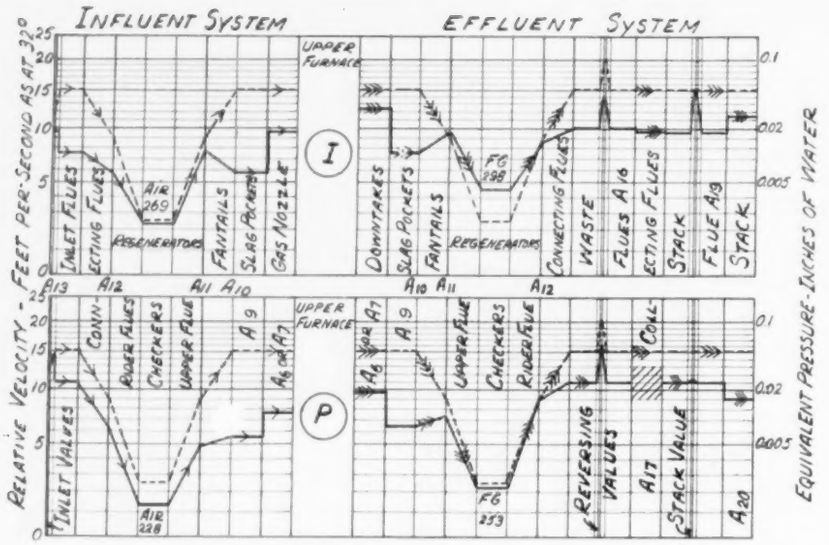

Fig. 207—Flow diagrams—ancillary systems—Group B, producer gas furnaces now fired with fixed fuels

move up but should never exceed the 15 foot per second velocity established as the maximum. In the same manner the velocity of the gases in the flues is calculated with the flues entirely free of dust. In some of the furnaces a considerable quantity may accumulate before interference to operation will result, while in others even with clean flues the velocities are above the ideal and totally without reserve for dust accumulation.

The velocities of the producer gas at the nozzle A_3 in all the typical furnaces, Fig. 206, are too high, but the consistency of the values as delineated may be significant.

The following comments are offered anent the individual furnaces:

FURNACE A: The entire system is crowded with serious bottle-necks in the collecting flue and stack. While the difference in velocity through the checkers, actual and ideal is only about 1 foot per second, this represents a curtailment of checker flue area of about 25 per cent, while the high velocities at A_{11} and A_{12} indicate poor distribution.

FURNACE J: The ascribed velocities at A_{11} and in the stack are too high for best operation. While the same criticism applies at the checkers the velocities through the checkers could be reduced by a change in checker brick to increase the checker flue area.

FURNACE K: Excepting for the producer gas velocity at the nozzle, none of the velocities delineated substantially exceed the ideal. The fine flue record of this unit and its accompanying flow diagrams, as well as the upper furnace diagram, Fig. 49, in general conclusively substantiate the principles developed in these works.

FURNACES N AND O: Flow conditions throughout the ancillary systems of both of these furnaces are badly crowded. The effects at A_{11} are particularly severe and the stack system appears materially undersized.

FURNACE I: With exception of the velocity through the effluent checkers, all flow conditions are good. The velocity through checkers could be reduced substantially by discarding the 4½-inch thick checker brick and substituting 3-inch units.

FURNACE P: All flow conditions in the ancillary system of this furnace are unusually good. This unit is one of the few of the typical furnaces that show evidence of careful design. The reasons for its indifferent operating record do not appear.

FURNACE G: The downtakes and effluent regenerative system are crowded rather badly. Its high stack creating ample draft likely is responsible for the fine general operating record.

FURNACE L: Area A_{11} is somewhat too small and it is thought that 10 feet per second velocity through the effluent checkers is unduly high even in 3-pass operation. If 10½ x 4½ x 3-inch checker brick were substituted for the present 10½ x 4½ x

THIS is the concluding installment of Mr. Buell's unusual study of open-hearth furnace design, which has been appearing in STEEL *continuously since the issue of June 3, 1935.*

The voluntary response from readers has been such as to indicate that the author and publishers will be justified in reprinting the articles in book form. Readers and others who would welcome the appearance of the series in more permanent form are invited to write to the editor of STEEL, *so that we may have a clearer idea of the volume of demand. Suggestions as to additions or omissions in the text matter also will be appreciated.*

THE EDITORS.

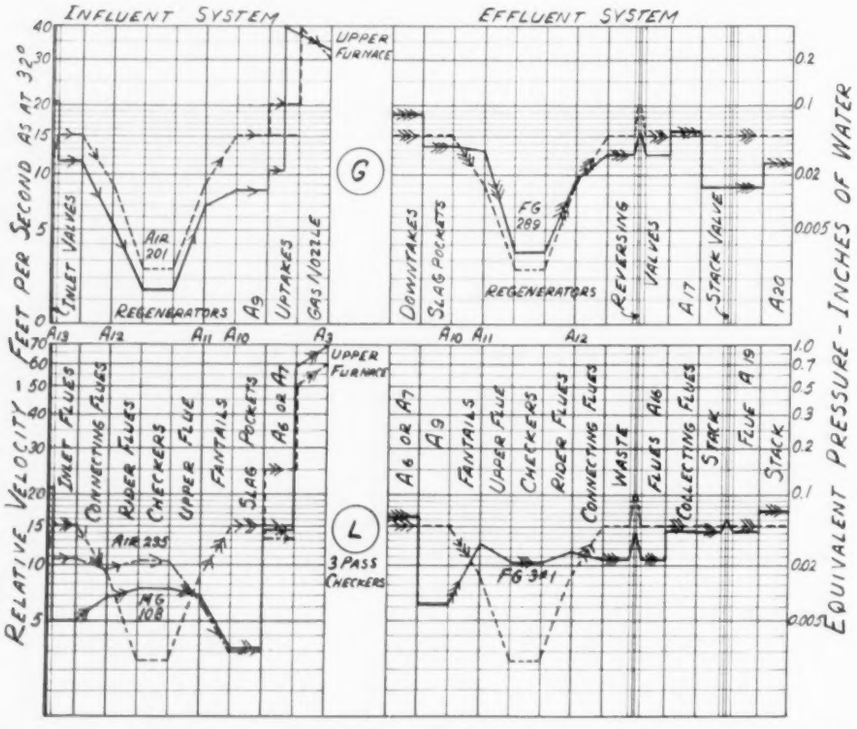

Fig. 208—Flow diagrams—ancillary systems—Group C, mixed gas fired furnaces

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Ferrocolumbium is a product of Electro Metallurgical Company. Our metallurgists will gladly further explain its uses and advantages. The booklet "Effects of Columbium in Chromium-Nickel Steels" will be sent you on request. Write for your copy today.

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Ferrosilicon 15% Ferrosilicon 50%
Ferrosilicon 75%
Ferrosilicon 80 to 85%
Ferrosilicon 90 to 95%
Refined Silicon
(minimum 97% Silicon)
Calcium Silicon
Calcium-Aluminum-Silicon
Calcium-Manganese-Silicon
Miscellaneous Silicon Alloys

BRIQUETS
(Patented)
Chrome Briquets Silicon Briquets
Manganese Briquets

COLUMBIUM

TUNGSTEN

MANGANESE
Standard Ferromanganese
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Low-Carbon Ferromanganese
Medium-Carbon Ferromanganese
Spiegeleisen
Manganese Metal
Manganese-Copper
Miscellaneous Manganese Alloys

SILICO-MANGANESE
All grades including Silico-Spiegel

VANADIUM
All Grades

ZIRCONIUM
35 to 40% Zirconium
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4½-inch size now installed the increased flue area would cause the velocity to decrease under 7 feet per second.

FIXED FUEL FIRED FURNACES: Examination of Fig. 209 indicates that excepting as to flow through the checkers, all velocity conditions are generally and substantially satisfactory. Furnaces B, D, E and M now are operating at much higher tonnage rates than those for which they originally were designed, but with regenerator chambers of essentially the original volume. Excepting furnace B, all of those previously mentioned use the 10½ x 4½ x 4½-inch checker brick. The replacement of these with 10½ x 4½ x 3-inch brick would reduce the ascribed velocities in the order of 510: 327, and the alteration would be well worth while.

The stack systems of furnaces D, E and H are abridged slightly in some detail.

Flow diagrams, while delineating velocity effects in a graphic manner, omit a factor of considerable importance to operating effects and results which cannot be depicted conveniently. This factor is the angularity of the flow channels, and as found particularly at the fantails, in the flues, and through above-ground valves, may be of equal or greater importance than velocity to overall results. Accordingly, when critically examining flow diagrams the missing factor of flow angularity must be given the consideration its importance warrants.

The first step towards the design of a new open-hearth furnace must invariably be the creation of an appropriate flow diagram along hypothetical lines and having the critical areas developed accordingly in both size and location.

Diagram Speeds Investigation

The proposed enlargement of any unit should be investigated from a flow diagram developed to present actual operations, with hypothetical flow after enlargement added. With such a picture it is at once possible to determine if maintenance will be difficult and costly, if operation at the proposed rates is feasible, or if any disclosed points of flow abridgement may be reduced appropriately.

And, finally, in the case of any furnace now installed in which any phase of operation does not meet with reasonable expectations, which might include low tonnage, high fuel rates, high hot maintenance or short campaigns, the developments of a diagram to illustrate the flow condition in the system of the particular instance is the quickest and surest, and, in addition, the certain method to diagnose the cause and prescribe the remedy. The correctly developed flow diagram pictures the condition in those parts of the system where adequate observation is impossible during operations.

Closure

Throughout this treatise and those preceding, the effort has been extended to analyze the open-hearth furnace with reference to all phases of its design, after giving primary effect to the importance of the operating factors which the furnace is supposed to support.

Especially in the larger plants, the open-hearth superintendent, is rather prone to judge the quality of his furnace operation from such operating factors as furnace life, ingot tonnage, or fuel rates, and data have been presented so that he may better judge the effects that may accrue from alteration of the structure, to the foregoing and similar items. It is not to be expected that the successful superintendent trained in the discipline of production as his primary aim will desire to enter the field to detailed design even should he be able to take the necessary time from his regular operating duties, but probably will delegate such matters to the cooperating engineer-designer who by his specialized train-

(Please turn to Page 54)

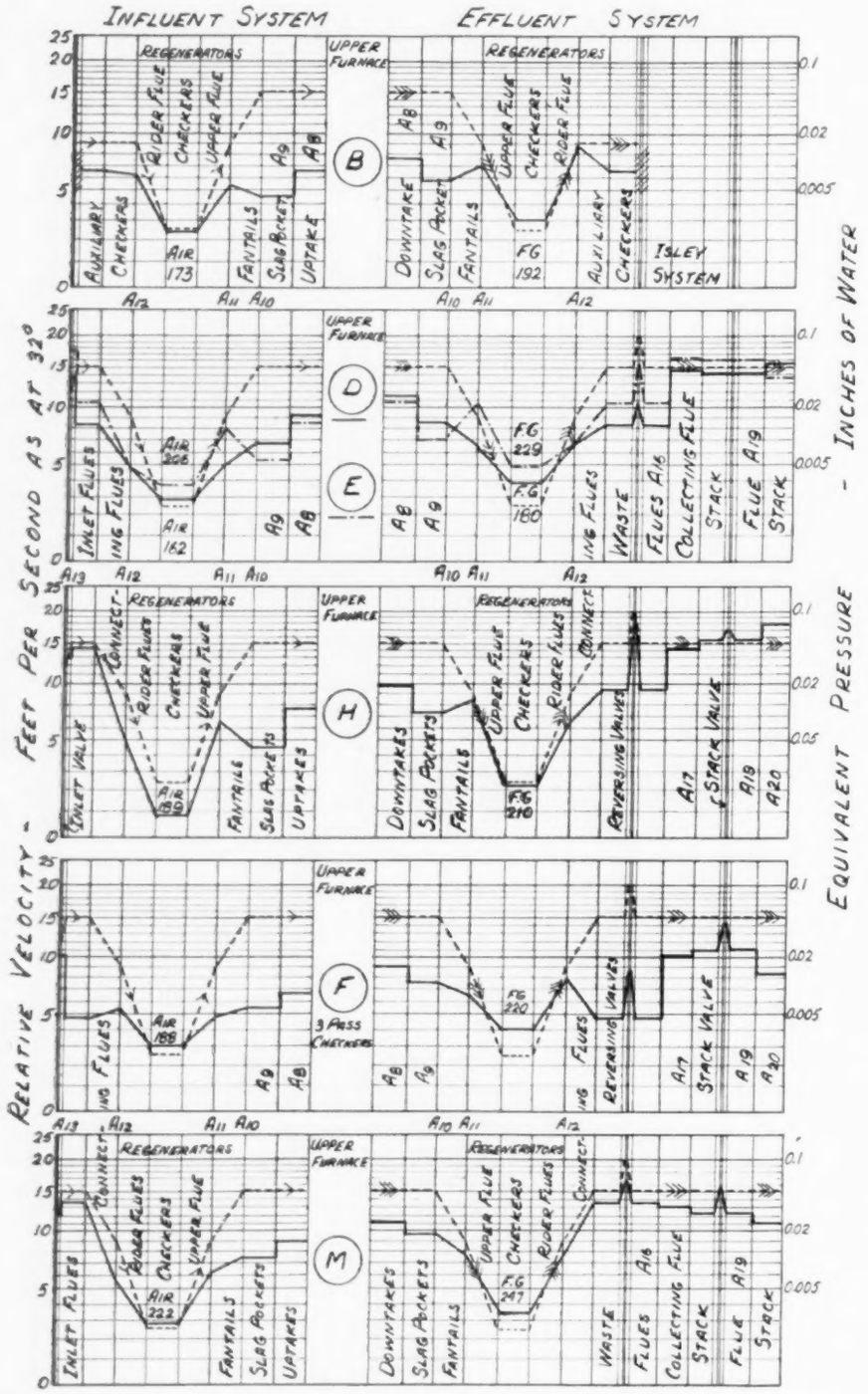
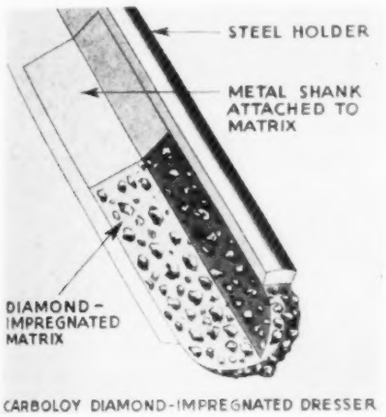


Fig. 209—Flow diagrams—ancillary systems—Group D, fixed fuel fired furnaces

NEW EQUIPMENT

Wheel Dresser—

Carboloy Co. Inc., Detroit, is announcing an additional grade of its diamond impregnated wheel dresser. The new grade, shown herewith, contains an extra coarse mesh of diamonds and has been developed to increase the order of performance on the larger and harder grades of grinding wheels used on surface, cylindrical and centerless grinders. This extra coarse grade supplements the existing grades of dressers containing fine, medium and coarse



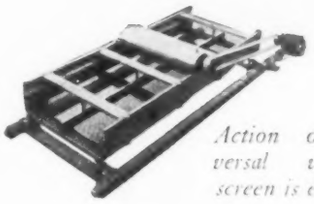
Grinding wheel dresser developed by Carboloy Co.

mesh size diamonds. With this development, the Carboloy dresser can now be used on all hardnesses and sizes of grinding wheels. Advantages of the diamond impregnated wheel dresser, as described by the manufacturer, are that no remountings are required, they stand unusual abuse, and each dresser may be used throughout its entire life on the same sized wheel.

• • •

Vibrating Screen—

Universal Vibrating Screen Co., Racine, Wis., is bringing out a new vibrating screen, the frame of which is constructed of alloy pressed steel. Vibratory screening action is elliptical, the greatest movement being in a direction perpendicular to the plane of the unit, shown herewith. A simple and effective method is employed to keep the screen sections



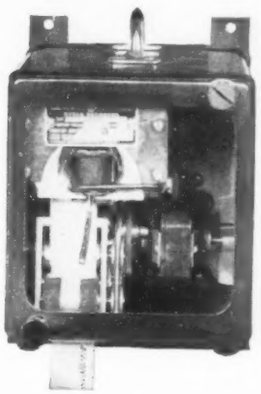
Action of Universal vibrating screen is elliptical

uniformly tight over the entire area. Moreover, it also permits rapid cloth change. Screens are driven from small electric motors, gas engines or direct from shafting in the plant. They are furnished either with or without driving equipment.

• • •

Cycle Recorder—

General Electric Co., Schenectady, N. Y., is offering a new cycle recorder, a device for providing pictorial evidence of the length of time current flows in an alternating-current circuit. This unit, shown herewith, is designed for use with resistance welder timers—in calibrat-



GE cycle recorder

ing or adjusting these timers or as a means of producing a permanent record of a weld time. By indicating when an accurate re-setting of welding time is attained, the new device is useful in duplicating welds previously found to be satisfactory. The instrument therefore not only records optimum welding time for a specific job as determined by experiment, but enables the production welding machines to be easily and quickly set to reproduce this time. It furnishes a check on the proper functioning of welder timers, and is of assistance in locating the cause of spoiled work.

• • •

Electric Time Recorder—

Stromberg Electric Co., 223 West Erie street, Chicago, is marketing an electric time recorder, shown herewith. Small in size, it can be conveniently hung anywhere, yet takes full-size standard time cards and

Only one hand is required to operate Stromberg time recorder

prints clearly legible time records on the front of the card when it is dropped in the funnel, face outward. It is equipped with a Telechron motor and can be plugged into an electric light socket or it may be used with a control clock.

• • •

Paint in Stick Form—

Helmer & Staley, 2489 South Parkway, Chicago, is marketing a new stick paint known as Markal. It is applied easily to any wet or dry surface and will not run when applied to hot metals, the company claims. It is made in two types, one for cold marking and the other for hot marking. The former type is employed for marking all metals including structural steel, steel sheets, galvanized iron, etc.; the latter type

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FERRO-CHROMIUM
High Carbon Grade (4 to 6% carbon). Low Carbon Grades (from maximum .06% carbon to maximum 2% carbon).

Special Iron Foundry Grade.

CHROMIUM METAL

ALSIFER
The Ferro-Silicon-Aluminum Deoxidizer Without a Disadvantage.

Also Special Alloys of Vanadium, Silicon, Chromium, Etc.

Large stocks are always maintained for prompt shipment. Write for complete information and prices.

VANADIUM CORPORATION OF AMERICA

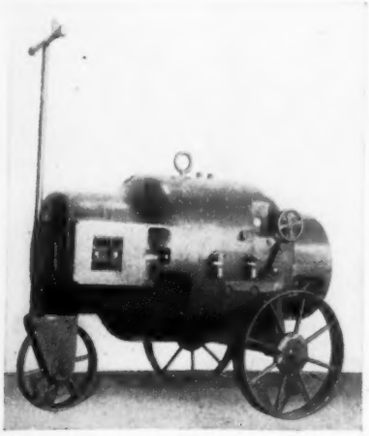
120 BROADWAY, NEW YORK, N. Y.

is being used successfully on steel shapes, forgings, castings, pipes, billets, etc. The company states that it marks clearly and permanently at any temperature from 300 to 1200 degrees Fahr., does not run or flow while hot or peel off after cooling. The product also is waterproof.

• • •

Direct-Current Welder—

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., recently announced a new direct-current welder embodying radical improvements in design. The unit, shown here-



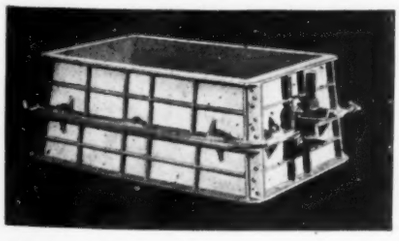
Westinghouse welder embodies design improvements

with, is equipped with a single dial preset control with which the welding current can be set to the exact number of amperes, thereby enabling it to maintain a constant arc in spite of speed changes of the driving motor caused by line fluctuations. This "Flexarc" welder, as it is known, is designed for general welding service or production work with bare, dust-coated or heavy-coated electrodes, and is self-contained from the conduit box to the welding terminals. Outer shell consists of two parts bolted together, forming a sturdy rigid unit.

• • •

Foundry Flask—

American Foundry Equipment Co., Mishawaka, Ind., is placing on the market a foundry flask that has



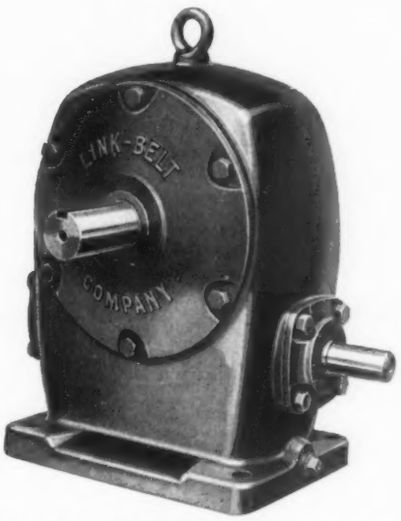
American foundry flask constructed of magnesium alloy

four outstanding features: Light weight, strengthened corner construction, especially designed pin pad, and a production increasing sand strip. The unit, shown herewith, is made of magnesium alloy. The corner design is of riveted construction which with ribbed construction of the side walls, provides a flask that is characterized by long life and continued accuracy. The patented pin pad permits the use of any standard pin. Molding machines, match plates, etc., do not have to be altered for a special pin. With a maximum taper of five degrees, the new flask allows for easy stripping.

• • •

Worm Gear Reducers—

Link-Belt Co., Philadelphia, is announcing a new line of cut tooth worm gear speed reducers available in a wide range of ratios and capacities, with single or double reduction, and in horizontal and vertical types. The output shaft with its



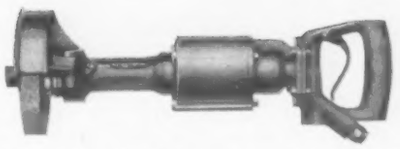
Link-Belt single-reduction worm gear speed reducer

chilled phosphor bronze worm wheel can be located above or below the worm shaft which is made of a low carbon alloy steel forging, carburized and heat treated after the worm threads have been cut thereon. A feature of the double reduction reducer is the unitized attachment of primary reduction to the side of the final reduction housing. The accompanying illustration shows the single reduction unit.

• • •

Rotary Air Grinders—

Cleveland Pneumatic Tool Co., 3734 East Seventy-eighth street, Cleveland, is placing on the market a series of rotary grinders, Nos. 860S and 860X, 845S and 845X, 830S and 830X. No. 845X is depicted in



Cleco No. 845X rotary grinder, one of a new series of units

the accompanying illustration. Features include alloy steel cylinder, machined from bar stock, and easily renewed; one-piece rotor of alloy steel, constructed to insure perfect balance and permit the use of wider impeller blades; turning of handle to change direction of exhaust; patented oil regulator to control flow of lubricant; improved governor for safe speed control; casing, governor body and handle of aluminum alloy castings for strength and lightness.

• • •

Two-Stage Reduction Regulator—

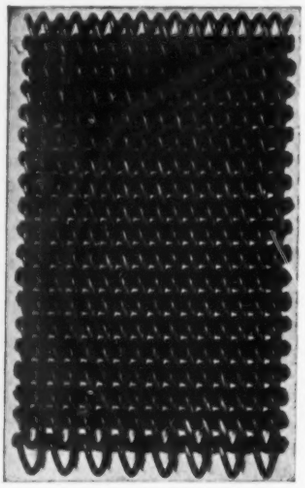
Air Reduction Sales Co., Lincoln building, New York, is bringing out a new heavy-duty type two-stage reduction regulator designated Airco style 8490. The device, shown herewith, is designed primarily to deliver larger volumes of oxygen at relatively high pressures such as may be encountered on heavy cutting, deseaming jobs, furnace tapping and in similar operations.

Marking a radical departure from

Airco-DB two-stage reduction regulator, heavy-duty type

conventional design, this regulator uses the "feed-back" principle. The low-pressure cavity is connected to the space in back of the first stage diaphragm by the passage through the control tube on the back of the regulator. The first stage spring main-

tains a certain difference in pressure between the first and second stages, much in the same manner as in the usual two-stage welding regulator, although the pressure difference varies in the latter for different operating pressures. However, whenever the adjusting screw is turned in, and pressure developed in the low pressure cavity, the same pressure will be developed in back of the first-stage diaphragm; this pressure augments the effect of the control spring thrust so that the first stage pressure increases by an amount equal to the operating pressure.



Cambridge woven wire conveyor belt

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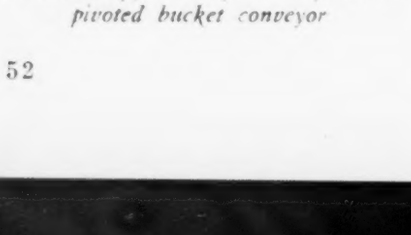
Woven Wire Conveyor Belt—

Cambridge Wire Cloth Co., Cambridge, Md., has developed a woven wire conveyor belt especially suited for handling hot castings. The construction, shown in the accompanying illustration, consists of a double weave reinforced with heavy straight wires. It effectively minimizes lateral contraction and longitudinal stretch.

• • •

Pivoted Bucket Conveyor—

Robins Conveying Belt Co., Mead-Morrison division, New York, is announcing an improved pivoted bucket conveyor. The chain assembly is independent of the buckets, providing easy installation and maintenance. Shown herewith, the movable tripper is designed to give a smooth, complete turnover of each bucket at any desired point in the upper run. Curved guiding surfaces on the tripper, and roller bearing rollers acting on the three-lobed cams of the buckets, eliminate wear and noise in dumping. Tripper wheels run on rails of the same gage as the conveyor.



Movable tripper is a feature of Robins pivoted bucket conveyor

• • •

Wedge and Roller Plate Grips

Smith Devices, 2245 North Twelfth street, Philadelphia, is marketing a line of grips for light and heavy duty. These include the wedge and roller plate grip, shown herewith, which embodies the same principle as the light and heavy type cable grips developed by the company. It consists of wedges, and rollers to eliminate friction, and has a large bearing surface on the plates so as to prevent any damage or marking of the plates, holding securely even if the plates are covered with ice or grease. They are made in sizes to handle all size plates.

Smith wedge and roller plate grip

• • •

Solderless Connectors—

Rattan Mfg. Co., New Haven, Conn., has just added two smaller sizes to its line of solderless connectors, as well as one with a porcelain cap instead of the usual bakelite cap. The smaller one is for use with two No. 16 wires or three No. 18 wires, while the next size holds two No. 14 and two No. 18 wires, or four No. 16, or five No. 18 twisted, or seven No. 18 not twisted. The model No. 7 with porcelain cover, shown herewith, is for places where the wires and the connecting medium are subjected to extremely high temperatures.

Left — Cutaway view shows construction of Rattan solderless connector

Right — Model No. 7 connector has porcelain cap

• • •

Burnishing Barrel—

Hanson-Van Winkle-Munning Co., Matawan, N. J., has brought out a new burnishing barrel, shown herewith. It may be operated at any angle which may be changed while the machine is running. Motor, gears and most of the cylinder are covered by a steel shell making the apparatus splash-proof. Safety guards are unnecessary with this machine. Operation is exceedingly simple. A motor control switch is mounted on the front of the frame. Notched plates on the right-hand trunnion bearing lock the barrel at the desired angle. A unique cover lifting device and support facilitate handling the machine and the work.

Burnishing barrel developed by Hanson-Van Winkle-Munning Co.

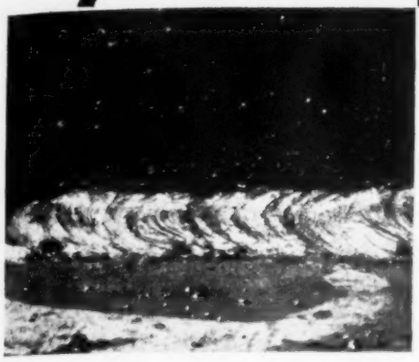
• • •

Flow Gun—

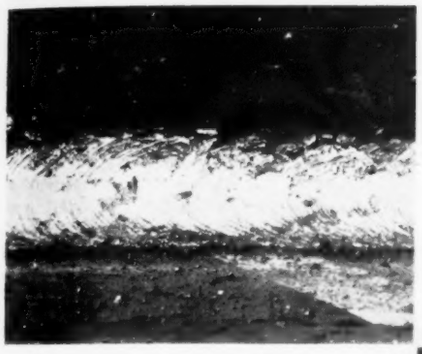
Binks Mfg. Co., 3114 Carroll avenue, Chicago, has perfected a new style flow gun to meet the demands for a device to flow on stripes of paint, rubber cement, or other materials. It is designed especially for flowing sealing compounds on autobody tops, striping automobile bumpers, and flowing cements and other plastic materials.

Material is forced out of the nozzle directly on to the work. Special nozzles are furnished and are used according to the type of work. Other nozzles can be built according to the specifications of the user to flow on any width of stripe up to one inch. Multiple nozzles flow parallel stripes. This No. 11 gun is small, light, and handy, and its full grip and four-finger trigger is especially suited to striping operations.

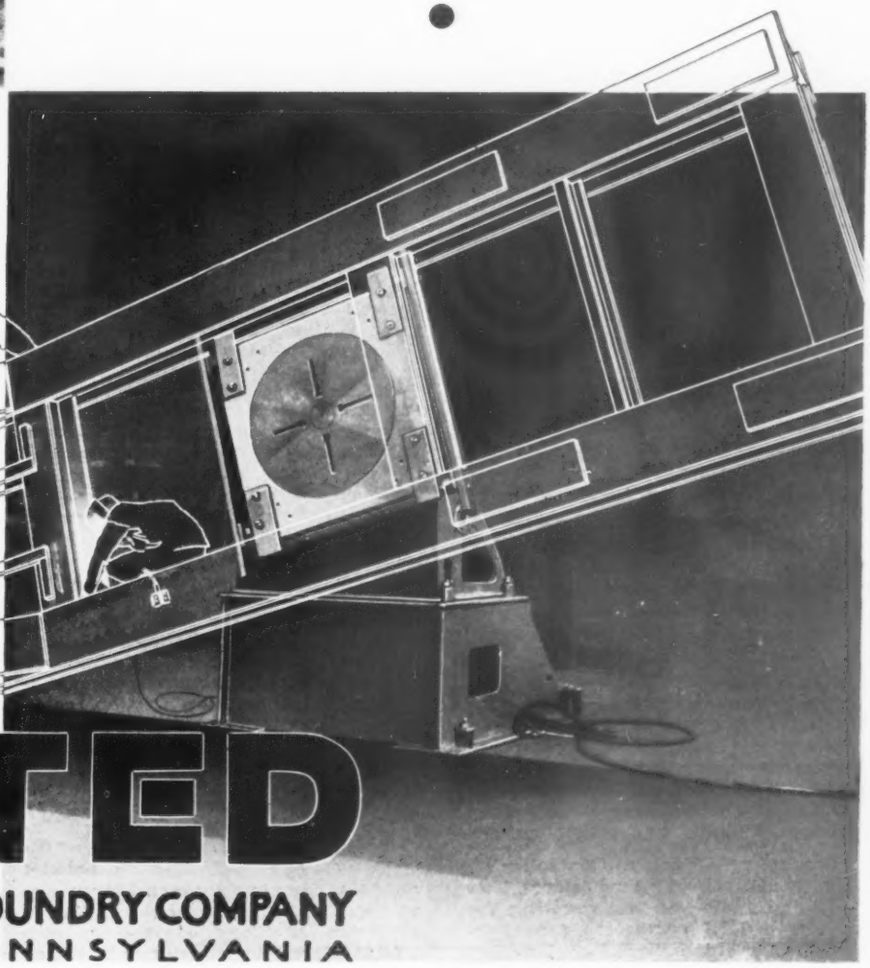
Two SATISFACTORY WELDS ..but the weld made on the manipulator cost 1/5 as much as the other . . .



This fillet weld was made with 5/32" dia. shielded arc welding rod with 150 amperes at rate of *1.40* lbs. per hour.



The same job welded on the Manipulator with 5/16" dia. shielded arc welding rod with 350 amperes at rate of *7.04* lbs. per hour.



Welding on the Manipulator Saves Labor and improves the appearance of the job

Manipulators built to handle any job up to 100 tons

Write for an Estimate on Your Job

United bulletin "Management of Welding Costs" will be gladly sent on request

UNITED

ENGINEERING *and* FOUNDRY COMPANY
PITTSBURGH — PENNSYLVANIA

New Trade Publications

Mixing Equipment — Patterson Foundry & Machine Co., East Liverpool, O. Catalog No. 355 relative to agitating and mixing equipment, with specifications and illustrations.

Diesel Locomotives—Euclid Road Machinery Co., railway transport division, Cleveland. Bulletin No. 1, giving general dimensions of the 35 and 55-ton type with illustrations of each, including summary of motive power.

Controllers—C. J. Tagliabue Mfg. Co., Park and Nostrand avenues, Brooklyn, N. Y. Bulletin No. 1127 introducing the company's new No. 40 controller, with details of its construction and description of its operation.

Machine Tools—Coats Machine Tool Co., 110 West Fortieth street, New York. A bulletin on its new type RP "Elasticometer" spring testing machines up to 750 pounds load, with specifications.

Screw, Nuts, Bolts—Pheoll Mfg. Co., 5700 Roosevelt road, Chicago. A catalog, with thumb index, of threaded products, including price lists, standard dimensional data, weight tables, and other information.

Carburizing — Surface Combustion Corp., Toledo, O. Folder No. SC-72 giving data on gas carburizing by the eutectrol process, continuous and batch type, with operating information and equipment views.

Arc Welders—J. D. Adams Co., welding division, Indianapolis. A folder featuring remote start-and-stop engine control, a new development by this company; lists other features of electrical and mechanical design, with specifications.

Centrifugal Pumps — Worthington Pump & Machinery Corp., Harrison, N. J. Folder, W-321-B7 357, giving concentrated informative material on the open impeller Monobloc pump with ratings and material in which it is available.

Grinding Machinery—Samuel C. Rogers & Co., 191 Dutton avenue, Buffalo. An illustrated price list covering various new models of knife and saw grinding machinery, saw filers, sharpeners, setters ,and gummers.

Melting—Detroit Electric Furnace Co., 825 West Elizabeth street, Detroit. A handbook-catalog on modern melting, with emphasis on the arc rocking principle; contains co-operative section on accessories for electrical melting.

Steel—Timken Steel & Tube Co., Canton, O. A supplement of Timken digest of steels for high temperature service, including full technical data on composition, short time high temperature tensile properties, creep strength, stability and resistance.

Contactors—Electric Controller & Mfg. Co., Cleveland. Two folders, Nos. 1140 and 1145, the first covering the new type LTZ contactors for alternating current service, emphasizing and illustrating this major improvement in design; the second describing the new discovery for crane, mill, and machinery controllers, scientific control of the arc.

Roller Bearings—Link-Belt Co., 300 West Pershing road, Chicago. Book No. 1494, presenting the new series 400 line of anti-friction bearing units equipped with Shafer double-row roller bearings, with illustrations, prices, and dimensions, in detail.

Valves—Toledo Steel Products Co., Toledo, O. A technical catalog of 89 pages, embracing data on valves, valve guides, stem keys, and seat inserts for passenger cars, trucks, tractors, buses, and motors; numerical list and progressive dimension chart included.

Conveyors—Robins Conveying Belt Co., 15 Park Row, New York. Bulletin No. 96, describing the improved McCaslin pivoted bucket conveyor recently perfected by Mead-Morrison division of the above company, with detailed diagram and informative comment.

Presses—Niagara Machine & Tool Works, 637 Northland avenue, Buffalo. Bulletin No. 58-E illustrating and describing the new line of Niagara Master series "A" and the improved line of standard series inclinable presses. Thirty-two pages of photographs and detail.

Bearings — Norma-Hoffmann Bearings Corp., Stamford, Conn. Machine tool application booklet No. F-947. A consideration of the company's application of precision bearings to machine tools, with blueprint drawings of spindles, grinders, lathes, buffing and milling machines.

Worm Gearing—Foote Bros. Gear & Machine Co., 5301 South Western boulevard, Chicago. Catalog No. 350, the new "Hygrade" worm reducer and "Moderntype" worm gearing; in three sections, history and development, design, and complete list of standard hobs.

Regulators—Hagan Corp., Pittsburgh. A group of bulletins, DR-29 to DR-32 inclusive, describing operations of its regulators, impulse amplification and remote control system, master sender, compensating relay, control panels, variable speed governor, ratio relay, thermostat, and bellows-operated steam regulating valve.

Roller Bearings—Timken Roller Bearing Co., Canton, O. A 12-page booklet on application of Timken tapered roller bearings on engine crankshafts; operating friction, cold-weather starting, and piston and cylinder wear, are discussed, and typical assemblies of the various types of engines shown.

Clearing Machines—Clearing Machine Corp., 6499 West Sixty-fifth street, Chicago. A 20-page booklet on this company's several new developments in power presses and power press auxiliary equipment; also a folder describing the device by which it is possible to reduce time and cost involved in duplicating dies.

Centrifugal Pumps—Morris Machine Works, Baldwinville, N. Y. Booklet No. 157 listing and illustrating Morris pumps, hydraulic dredges, and steam engines. Also includes considerable information of use to centrifugal pump users.

Improving Design of Open-Hearth Furnaces

(*Concluded from Page* 48)

ing will be able to include any of the many suggested improvements in the structure to best advantage.

For the benefit of the engineer whether for use as a basis of design or further research, all data pertaining to the correct inclusion of all of the materials commonly employed in the structure, as well as those necessary for the estimation of thermal reactions resulting from the carrying out of the process has been included with the underlying idea of causing it to be unnecessary to look beyond the limit of these works for any of the essential information necessary to design or research.

While the superintendent judges the quality of his furnace operations on various operating factors, his superiors do not judge his ability in the terms of such items, excepting only after they have been converted collectively into the dollars and cents term of cost, which is the ultimate and only measure of competence.

Throughout these works wherever possible all data have been evaluated into money terms with the fundamental idea of causing the operator, engineer and researcher to become cost-conscious. Economics are undeniably a most important branch of the engineering profession and likely the least understood or generally applied by those whom they vitally concern. The attempt has been made to treat the economic side of the subject in such a manner as to foster a more common evaluation of engineering problems into tangible values of money which are the only values of universal comprehension.

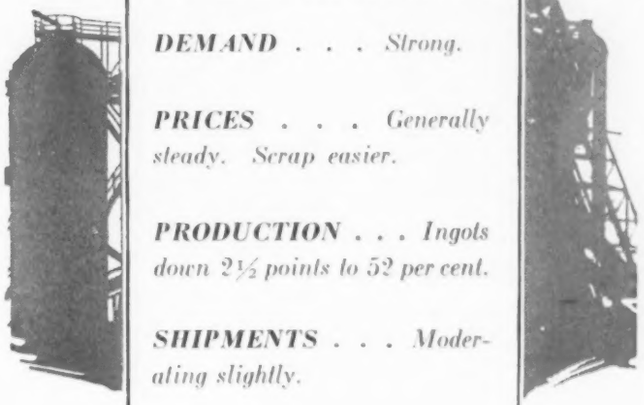
The open-hearth furnace has been treated in these works, first, on account of the importance of steel to our civilization, and second, because within this furnace the most severe and costly operation of large tonnage, high temperature, basic industry is conducted.

As previously mentioned the general analyses developed and principles expounded all have common application to any high-temperature application or process using combustion heat and, therefore, the treatise has a universal field in such operations.

(*The End*)

Strong Undertone Tempers Holiday Recession

Steelmakimg at 52 Per Cent; Suspension One Day Only; Rapid Rebound Is Expected



MARKET IN TABLOID

DEMAND . . . *Strong.*

PRICES . . . *Generally steady. Scrap easier.*

PRODUCTION . . . *Ingots down 2½ points to 52 per cent.*

SHIPMENTS . . . *Moderating slightly.*

A STRONG upward swing in steel demand from major consuming industries which appears to be getting under way for 1936 is expected to hold holiday interruptions in production to an irreducible minimum.

Except for suspensions one day for Christmas, and again for New Year, raw steel output and finishing mill capacity will carry through at last week's operating rates, a much higher average than in these weeks last year.

Tin plate mills, after continuing last week at 80 per cent, and making the largest wage disbursements since 1929, will shut down this week for repairs.

Year-end influences have been tempered to an unusual degree by sustained requirements from manufacturers of automobiles, tractors, farm implements, household equipment, containers, and railroad and structural work.

Another active week in construction resulted in awards of 25,584 tons of shapes and 19,803 tons of reinforcing bars. This outlet is among the most promising for early 1936.

After experiencing their best market in five years, manufacturers of farm equipment are preparing for a new all-time peak in 1936. Their steel specifications show a continuity equal to that of the automobile industry.

In automobiles, December production, estimated at 400,000, is comparable with the year's highest records attained in March and April. Last week's assemblies were increased by 4500 units, to 103,000. Dealers' stocks are low, and while the resale market is unsettled, new car production in January is expected to be substantial. Leading makers will take only a brief respite this week. Among the few exceptions, Pontiac will shut down for two weeks. Ford plants, temporarily congested with steel, have issued some hold-up orders.

New structural inquiry was headed by 4000 tons for Chevrolet's Los Angeles assembly plant. For vessel contracts awarded to eastern yards, 16,500 tons of steel will be placed shortly, including 15,000 tons for International Mercantile Marine-Roosevelt Steamship Co.'s liner. At Pittsburgh, ten river barges were ordered, requiring 2100 tons.

Reinforcing bar awards were topped by 15,000 tons for flood control in the Los Angeles district. Pacific coast markets this year have accounted for 220,356 tons of bars, nearly double 1934.

Santa Fe's $28,400,000 approved budget for 1936 calls for 550 new freight cars, and an extensive program of car and locomotive repairs, and rail purchases. Grand Trunk is buying steel for rebuilding 600 freight cars. Westinghouse Air Brake Co. has taken a $1,500,000 order for 10,000 sets of airbrakes for Pennsylvania freight cars.

Pig iron shipments for December will be heaviest of any month this year. That this is not due entirely to speculative purchases is indicated by a corresponding movement in foundry coke. Scrap demand is strong, but heavy melting steel is down 25 cents at Pittsburgh and Chicago.

It now is apparent that a test on the $2 a ton advance in semifinished steel, and $1 a ton in pig iron, announced for Jan. 1, will not come until late January or early February, as difficulties in completing contracts have forced a time extension. Rumors of an advance on finished steel in the first quarter still persist in eastern markets, but at Detroit, sheets and cold-rolled strip are definitely lower, by as much as $3 a ton for the most attractive tonnages.

Steelworks operations last week were down 2½ points to 52 per cent. Pittsburgh dropped 2 to 40, Cleveland 2 to 82, eastern Pennsylvania 1½ to 35½, Detroit 6 to 88, Youngstown 6 to 56. Chicago was up 1½ to 60½, Buffalo 3 to 50, New England 1 to 83; others unchanged.

STEEL's iron and steel price composite is off 1 cent to $33.31; the finished steel index unchanged at $53.70, and the scrap composite down 17 cents to $13.12.

COMPOSITE MARKET AVERAGES

	Dec. 21	Dec. 14	Dec. 7	One Month Ago Nov., 1935	Three Months Ago Sept., 1935	One Year Ago Dec., 1934	Five Years Ago Dec., 1930
Iron and Steel	$33.31	$33.32	$33.30	$33.15	$32.82	$32.39	$31.69
Finished Steel	53.70	53.70	53.70	53.70	53.70	54.00	49.30
Steelworks Scrap	13.12	13.29	13.16	12.92	12.65	11.02	10.77

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire sheets, plates, shapes, bars, black pipe, rails, alloy steel hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	Dec. 21, 1935	Nov. 1935	Sept. 1935	Dec. 1934
Finished Material				
Steel bars, Pittsburgh	1.85c	1.85	1.85	1.80
Steel bars, Chicago	1.90	1.90	1.85	1.85
Steel bars, Philadelphia	2.16	2.16	2.11	2.09
Iron bars, Terre Haute, Ind.	1.75	1.75	1.75	1.75
Shapes, Pittsburgh	1.80	1.80	1.80	1.80
Shapes, Philadelphia	2.01½	2.01½	2.01½	2.00½
Shapes, Chicago	1.85	1.85	1.85	1.85
Tank plates, Pittsburgh	1.80	1.80	1.80	1.80
Tank plates, Philadelphia	2.00	1.99	1.99	1.98½
Tank plates, Chicago	1.85	1.85	1.85	1.85
Sheets, No. 10, hot rolled, Pitts.	1.85	1.85	1.85	1.85
Sheets, No. 24, hot ann., Pitts.	2.40	2.40	2.40	2.40
Sheets, No. 24, galvan., Pitts.	3.10	3.10	3.10	3.10
Sheets, No. 10, hot rolled, Gary	1.95	1.95	1.95	1.95
Sheets, No. 24, hot anneal., Gary	2.50	2.50	2.50	2.50
Sheets, No. 24, galvan., Gary	3.20	3.20	3.20	3.20
Plain wire, Pittsburgh	2.30	2.30	2.30	2.30
Tin plate, per base box, Pitts.	5.25	5.25	5.25	5.25
Wire nails, Pittsburgh	2.40	2.40	2.40	2.60
Semifinished Material				
Sheet bars, open-hearth, Youngs.	$30.00	29.50	28.00	28.00
Sheet bars, open-hearth, Pitts.	30.00	29.50	28.00	28.00
Billets, open-hearth, Pittsburgh	29.00	28.50	27.00	27.00
Wire rods, Pittsburgh	38.00	38.00	38.00	38.00

	Dec. 21, 1935	Nov. 1935	Sept. 1935	Dec. 1934
Pig Iron				
Bessemer, del. Pitts.	$20.8133	$20.8132	$19.8132	$19.76
Basic, Valley	19.00	19.00	18.00	18.00
Basic, eastern, del. eastern Pa.	20.8132	20.8132	19.8132	19.76
No. 2 fdry., del. Pitts.	20.3132	20.3132	19.3132	19.26
No. 2 fdry., Chicago	19.50	19.50	18.50	18.50
Southern No. 2, Birm.	15.50	14.75	14.50	14.50
Southern No. 2 del. Cincinnati	20.2007	20.2007	19.2007	19.13
No. 2X eastern, del. Phila.	21.6883	21.6882	20.6882	20.63
Malleable, Valley	19.50	19.50	18.50	18.50
Malleable, Chicago	19.50	19.50	18.50	18.50
Lake Sup. charcoal, del. Chi.	25.2528	25.2528	24.2528	24.04
Ferromanganese, del. Pitts.	90.13	90.13	90.13	89.79
Gray forge, del. Pitts.	19.6741	19.6741	18.6741	18.63
Scrap				
Heavy melting steel, Pittsburgh	$14.25	13.65	13.45	12.95
Heavy melt. steel, No. 2, east. Pa.	11.25	11.00	11.25	9.30
Heavy melting steel, Chicago	13.25	13.20	12.55	10.55
Rails for rolling, Chicago	14.25	14.30	13.90	11.65
Railroad steel specialties, Chicago	14.25	13.75	13.75	11.90
Coke				
Connellsville, furnace, ovens	$3.50	3.55	3.25	3.60
Connellsville, foundry, ovens	4.00	4.35	4.00	4.60
Chicago, by-product foundry, del.	9.75	9.75	9.25	9.25

Steel, Iron, Raw Material, Fuel and Metals Prices

Except when otherwise designated, prices are base, f.o.b. cars. Asterisk denotes price change this week

Sheet Steel

Hot Rolled No. 10, 24-48 in.

Pittsburgh	1.85c
Gary	1.95c
Chicago, delivered	1.98c
New York, del.	2.20c
Philadelphia, del.	2.16c
Birmingham	2.00c
St. Louis, del.	2.18c
Pacific ports, f.o.b. cars, dock	2.40c

Hot Rolled Annealed No. 24

Pittsburgh	2.40c
Gary	2.50c
Chicago, delivered	2.53c
*Detroit, delivered	2.45c-2.60c
New York, del.	2.75c
Philadelphia, del.	2.71c
Birmingham	2.55c
St. Louis, del.	2.72c
Pacific ports, f.o.b. cars, dock	3.05c

Galvanized No. 24

Pittsburgh	3.10c
Gary	3.20c
Chicago, delivered	3.23c
Philadelphia, del.	3.41c
New York, del.	3.45c
Birmingham	3.25c
St. Louis, del.	3.43c
Pacific ports, f.o.b. cars, dock	3.70c

Tin Mill Black No. 28

Pittsburgh	2.75c
Gary	2.85c
St. Louis, delivered	3.08c

Cold Rolled No. 10

Pittsburgh	2.50c
Gary	2.60c
*Detroit, delivered	2.55c-2.70c
Philadelphia, del.	2.81c
New York, del.	2.85c
Pacific ports, f.o.b. cars, dock	3.10c

Cold Rolled No. 20

Pittsburgh	2.95c
Gary	3.05c
*Detroit, delivered	3.00c-3.15c
Philadelphia, del.	3.26c
New York, del.	3.30c

Enameling Sheets

Pittsburgh, No. 10	2.50c
Pittsburgh, No. 20	3.10c
Gary, No. 10	2.60c
Gary, No. 20	3.20c

Tin and Terne Plate

Gary base, 10 cents higher.

Tin plate, coke base (box) Pittsburgh	$5.25
Do., waste-waste	2.75c
Do., strips	2.50c
Long ternes, No. 24 unassorted, Pitts.	3.40c
Do., Gary	3.50c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	23.00	24.00
Plates	26.00	28.00
Sheets	33.00	35.00
Hot strip	20.75	22.75
Cold strip	27.00	29.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	17.00	18.50	21.00	26.00
Plates	20.00	21.50	24.00	29.00
Sheets	25.00	28.00	31.00	35.00
Hot strip	15.75	16.75	21.75	26.75
Cold stp.	20.50	22.00	27.00	35.00

Steel Plates

Pittsburgh	1.80c
New York, del.	2.09c
Philadelphia, del.	1.99c
Boston, delivered	2.22c
Buffalo, delivered	2.05c
Chicago or Gary	1.85c
Cleveland, del.	1.99½c
Birmingham	1.95c
Coatesville, base	1.90c
Sparrows Pt., base	1.90c
Pacific ports, f.o.b. cars, dock	2.35c
St. Louis, delivered	2.08c

Structural Shapes

Pittsburgh	1.80c
Philadelphia, del.	2.01½c
New York, del.	2.06½c
Boston, delivered	2.20½c
Bethlehem	1.90c
Chicago	1.85c
Cleveland, del.	2.00c
Buffalo	1.90c
Gulf Ports	2.20c
Birmingham	1.95c
Pacific ports, f.o.b. cars, dock	2.35c

Bars

Soft Steel
(Base, 5 to 25 tons)

Pittsburgh	1.85c
Chicago or Gary	1.90c
Duluth	2.00c
Birmingham	2.00c
Cleveland	1.90c
Buffalo	1.95c
Detroit, delivered	2.00c
Pacific ports, f.o.b. cars, dock	2.40c
Philadelphia, del.	2.16c
Boston, delivered	2.27c
New York, del.	2.20c
Pitts., forg. qual.	2.10c

Rail Steel
To Manufacturing Trade

Pittsburgh	1.70c
Chicago or Gary	1.75c
Moline, Ill.	1.75c
Cleveland	1.75c
Buffalo	1.80c

Iron

Troy, N. Y.	1.70c
Terre Haute, Ind.	1.75c
Chicago	1.80c
Philadelphia	2.06c
Pittsburgh, refined	2.75-7.50c

Reinforcing

New billet, straight lengths, quoted by distributors.

Pittsburgh	2.05c
Chicago, Gary, Buffalo, Cleve., Birm., Young	2.10c
Gulf ports	2.45c
Pacific coast ports f.o.b. cars dock	2.45c
Philadelphia, del.	2.36c

Rail steel, straight lengths, quoted by distributors

Pittsburgh	1.90c
Chicago, Buffalo, Cleveland, Birm., Young.	1.95c
Gulf ports	2.30c

Wire Products

(Prices apply to straight or mixed carloads; less carloads $4 higher; less carloads fencing $5 over base column.)

Base Pitts.-Cleve. 100 lb. keg.	
Standard wire nails	$2.40
Cement coated nails	2.40
Galvanized nails, 15 gage and coarser	4.40
do. finer than 15 gage	4.90

(Per pound)

Polished staples	3.10c
Galvanized fence staples	3.35c
Barbed wire, galv.	2.80c
Annealed fence wire	2.45c
Galvanized fence wire	2.80c
Woven wire fencing (base column, c.l.)	$61.00

To Manufacturing Trade

Plain wire, 6-9 gage	2.30c

Anderson, Ind. (merchant products only) and Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire, Pittsburgh or Cleveland	2.90c

Do., Chicago up $1, Worcester, $2.

Cold-Finished Carbon Bars and Shafting

Base, Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs	2.10c
20,000 to 59,999 lbs.	2.05c
60,000 to 99,999 lbs.	2.00c
100,000 lbs and over	1.97½c

Gary, Ind., Cleve., Chi., up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

Alloy Steel Bars (Hot)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.45c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo. 0.50
4600 0.20 to 0.30 Mo. 1.25-1.75 Ni. 1.05
5100 0.80-1.10 Cr. 0.45
5100 Cr. spring ..... base
6100 bars 1.20
6100 spring 0.70
Cr., Ni., Van. 1.50
Carbon Van. 0.95
9250 ..... carbon base plus extras

Piling

Pittsburgh	2.15c
Chicago, Buffalo	2.25c

Strip and Hoops

Hot strip to 23⅞-in.	
Pittsburgh	1.85c
Chicago or Gary	1.95c
Birmingham base	2.00c
Detroit, delivered	2.05c
Philadelphia, del.	2.16c
New York, del.	2.20c
Cooperage hoop,	
Pittsburgh	1.95c
Chicago	2.05c
Cold-strip, Pitts. Cleve.	2.60c
Detroit, del.	2.65c
Worcester, Mass.	2.80c

Rails, Track Material

(Gross Tons)

Standard rails, mill	$36.37½
Relay rails, Pitts.	
20-45 lbs.	$28.00
45-50 lbs.	$25.00
50-60 lbs.	$26.00
70-75 lbs.	$24.50
80-90 lbs.	$26.00
100 lbs.	$27.00
Light rails, billet qual. Pitts., Chi.	$35.00
Do., reroll, qual.	34.00
Angle bars, billet, Gary, Ind., So. Chi.	2.55c
Do., axle steel	2.10c
Spikes, R. R. base	2.60c
Track bolts, base	3.60c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $2; 16 and 20 lbs., up $1; 12 lbs. up $2; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots, Dec. 1, 1932, lists, 10% extra for less full containers.

Carriage and Machine

½ x 6 and smaller	70-10-5 off
Do. larger	70-10 off
Tire bolts	55 off

Plow Bolts

All sizes	70-10 off

Stove Bolts

In packages with nuts attached 72½-10 off; in packages with nuts separate 72½-10-5 off; in bulk 82½ off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.

Step bolts	65-5 off
Elevator bolts	65-5 off

Nuts

S. A. E. semifinished hex.: ½ to ⅞-inch ..... 60-20-15 off
Do., 1 to 1 inch 60-20-15 off
Do., over 1-inch 60-20-15 off

Hexagon Cap Screws

Milled	80-10-10 off
Upset, 1-in., smaller	85 off

Square Head Set Screws

Upset, 1-in., smaller	75-10 off
Headless set screws	75 off

Rivets, Wrought Washers

Struc., c. l., Pittsburgh, Cleveland	2.90c
Struc., c. l., Chicago	3.00c
⅞-in. and smaller, Pitts., Chi., Cleve.	70 and 5 off
Wrought washers, Pitts., Chi., Phila., to jobbers & large nut, bolt mfrs.	$6.25 off

Cut Nails

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more no discount on size extras	$3.05
Do. under 5 kegs; no discount on size extras	$3.20

Pipe and Tubing

Base $200 net ton, expect on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago, del. 2½ points less. Wrought pipe, Pittsburgh.

Butt Weld

In.	Blk.	Galv.
Steel		
¼ and ⅜	53½	35
½	58½	47
¾	62	52
1—3	64	55
Iron		
⅛	31½	15
¼	36½	20½
⅜	39½	25½
½	41½	26

Lap Weld

Steel		
2	60	51
2½—3	63	54
3½—6	65	56
7 and 8	64	54
9 and 10	63½	53½
Iron		
2	37	22½
2½—3½	38	25
4—8	40	28½

Line Pipe

Steel	
½, butt weld	57½
⅛-inch, butt weld	50½
¼—⅜, butt weld	52½
¾, butt weld	61
1—3, butt weld	63
2-inch, lap weld	59
2½—3, lap weld	62
3½—6, lap weld	64
7—8, lap weld	63
Iron	

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe lists, 8—12-inch, no extra.

Boiler Tubes

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		*Charcoal Iron*	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¼—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 200 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 lbs., 2 points under base

Seamless Boiler Tubes

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots or 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are uoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound. Less-carloads revised as of July 1, 1935, card.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices also being on a lb. and 100 ft. basis.

Seamless Tubing

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$39.00-40.00
4-in., Birmingham	42.00-43.00
4-in., Chicago	50.40-51.40
6 to 24-in. Chicago	47.40-48.40
6-in. & over, east. fdy.	43.00
Do., 4-in.	46.00

Class A pipe $3 over Class B.

Stnd. fitgs., Birm. base	$100.00

Semifinished Steel

Billets and Blooms

4 x 4-inch base; gross ton

Pitts., Chi., Cleve., and Youngstown	$29.00
Philadelphia	34.67
Duluth	31.00

Forging Billets

6 x 6 to 9 x 9-in., base

Pitts., Chi., Buff.	35.00
Forging, Duluth	37.00

Sheet Bars

Pitts., Cleve., Young., Chi., Buff., Canton, Sparrows Pt.	30.00

Slabs

Pitts., Chi., Cleve., Young.	29.00

Wire Rods

(Common; combination up $2)

Pitts., Cleveland	40.00
Chicago	41.00
Worcester, Mass.	42.00

Skelp

Pitts., Chi., Young., Buff., Coatesville, Sparrows Point	1.80c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$3.50- 3.65
Connellsville, fdry.	4.00- 4.25
Connel., prem. fdry.	5.50- 5.75
New River fdry.	6.00
Wise county fdry.	4.45- 5.00
Wise county fur.	4.00- 4.50

By-Product Foundry

Newark, N. J., del.	9.20- 9.65
Chi., ov., outside del.	9.00
Chicago, del.	9.75
New England, del.	11.50
St. Louis, del.	10.00
Birmingham, ovens	6.50
Indianapolis, del.	9.40
Cincinnati, del.	9.50
Cleveland, del.	9.75
Buffalo, ovens	7.50- 8.00
Detroit, ov., out. del.	9.06
Philadelphia, del.	9.03

Coke By-Products

Per gallon, producers' plants.

	Tank lots	Spot
Pure and 90% benzol		18.00c
Toluol		30.00c
Solvent naphtha		30.00c
Commercial xylol		30.00c

Per lb. f.o.b. New York.

Phenol (200 lb. drums)	16.30c
Do. (100 lbs.)	17.30c

Eastern Plants, per lb.

Naphthalene flakes and balls, in bbls., to jobbers	6.75c

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.20

†Western prices, ½-cent up.

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25; 50c diff. for each 0.25 below 1.75. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$20 50	$21.00	$20.00	$21.50
Birdsboro, Pa.	20.50	21.00	20.00	21.50
Birmingham, Ala., southern del.	15.50	15.50	14.50	21.00
Buffalo	19.50	20.00	18.50	20.50
Chicago	19.50	19.50	19.00	20.00
Cleveland	19.50	19.50	19.00	20.00
Detroit	19.50	19.50	19.00	20.00
Duluth	20.00	20.00	.....	20.50
Erie, Pa.	19.50	20.00	19.00	20.50
Everett, Mass.	20.50	21.00	20.00	21.50
Hamilton, O.,	19.50	19.50	19.00	.....
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	19.50	19.50	19.00	20.00
Provo, Utah	17.50	.....	17.00	.....
Sharpsville, Pa.	19.50	19.50	19.00	20.00
Sparrows Point, Md.	20.50	.....	20.00	.....
Swedeland, Pa.	20.50	21.00	20.00	21.50
Toledo, O.	19.50	19.50	19.00	20.00
Youngstown, O.	19.50	19.50	19.00	20.00
Delivered from Basing Points:				
Akron, O., from Cleveland	20.76	20.76	26.26	21.26
Baltimore from Birmingham	21.08	.....	19.96	.....
Boston from Birmingham	20.62	.....	20.50	.....
Boston from Everett, Mass.	21.00	21.50	20.50	22.00
Boston from Buffalo	21.00	21.50	20.50	22.00
Brooklyn, N. Y., from Bethlehem	22.93	23.43	.....	.....
Brooklyn, N. Y., from Bmghm.	22.50	.....	.....	.....
Canton, O., from Cleveland	20.76	20.76	20.26	21.26
Chicago from Birmingham	†19.72	.....	19.60	.....
Cincinnati from Hamilton, O.	20.58	20.58	20.08	.....
Cincinnati from Birmingham	20 20	.....	19.20	.....
Cleveland from Birmingham	19.62	.....	19.12	.....
Indianapolis from Hamilton, O.	21.93	21.93	21.43	22.43
Mansfield, O., from Toledo, O.	21.26	21.26	20.76	21.76
Milwaukee from Chicago	20.57	20.57	20.07	21.07
Muskegon, Mich., from Chicago Toledo or Detroit	22.60	22.60	22.10	23.10
Newark, N. J., from Birmingham	21.61	.....	.....	.....
Newark, N. J., from Bethlehem	21.99	22.49	.....	.....
Philadelphia from Birmingham	20.93	.....	20.81	.....
Philadelphia from Swedeland, Pa.	21.31	21.81	20.81	.....
Pittsburgh district from Neville Island	Neville base plus 67c, 81c and $1.21 switching charges			
Saginaw, Mich., from Detroit	21.75	21.75	21.25	21.25

Delivered from Basing Points:	No. 2 Fdry	Malleable	Basic	Bessemer
St. Louis, northern	20.00	20.00	19.50	.....
St. Louis from Birmingham	†19.62	.....	19.50	.....
St. Paul from Duluth	21.94	21.94	.....	22.44

†Over 0.70 phos.

Low Phos

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., $24.00, Phila. base, standard and copper bearing, $25.13.

Gray Forge		Charcoal	
Valley furnace	19.00	Lake Superior fur.	$22.00
Pitts. dist. fur.	19.00	Do., del. Chicago	25.25
		Lyles, Tenn.	22.50

Silvery†

Jackson county, O., base: 6-6.50 per cent $22.75; 6.51-7—$23.25; 7-7.50—$23.75; 7.51-8—$24.25; 8-8.50—$24.75; 8.51-9—$25.25; 9-9.50—$25.75. Buffalo $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base: Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon: 2 to 3%, $1 per ton additional. Each unit over 3%, $1 per ton additional.

Refractories

Per 1000 f.o.b. Works

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$55.00

First Quality

Pa., Ill., Md., Mo.	$45.00
Alabama, Ga., Ky.	$40.00-45.00

Second Quality

Pa., Ill., Ky., Md., Mo.	40.00
Ga., Ala.	35.00

Ohio

First quality	$40.00
Intermediary	37.00
Second quality	28.00

Malleable Bung Brick

All bases	50.00

Silica Brick

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	52.00

Magnesite

Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	$45.00
Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	40.00
Domestic dead-burned gr. net ton f.o.b. Chewelah, Wash. (bulk)	22.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$45.00
Chemically bonded chrome brick	45.00
Magnesite brick	65.00
Chemically bonded magnesite brick	55.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$20.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$16.00-17.00

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	85.00
Do., Balti. base	85.00
Do., del. Pittsb'gh	90.13
Spiegeleisen, 19-20% dom. Palmerton, Pa., spot†	26.00
Do., New Orleans	26.00
Ferrosilicon, 50% freight all., cl.	77.50
Do., less carload	85.00
Do., 75 per cent	126-130.00
Spot, $5 a ton higher.	
Silicoman., 2½ carb.	90.00
2% carbon, 95.00; 1%,	105.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del.	10.00
Ferrotungsten, stand., lb. con. del.	1.35- 1.45
Ferrovanadium, 35 to 40% lb., cont.	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
Do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	65.00
Ferromolybdenum, stand. 55-65%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads, Quan. diff. apply.

Nonferrous

METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Chinese Spot, N. Y.	Nickel Cathodes
Dec. 14	9.25	9.37½	8.85	49.50	47.37½	4.50	4.35	4.85	*19.00	14.50	35.00
Dec. 16	9.25	9.37½	8.85	49.85	47.62½	4.50	4.35	4.85	*19.00	14.50	35.00
Dec. 17	9.25	9.37½	8.85	49.87½	47.85	4.50	4.35	4.85	*19.00	14.50	35.00
Dec. 18	9.25	9.37½	8.85	49.50	47.80	4.50	4.35	4.85	*19.00	14.50	35.00
Dec. 19	9.25	9.37½	8.85	49.25	47.62½	4.50	4.35	4.85	*19.00	14.50	35.00
Dec. 20	9.25	9.37½	8.85	49.00	50.00	4.50	4.35	4.85	*19.00	14.50	35.00

*Nominal range 19.00 to 21.00c.

MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 9.00c Conn. copper.

Sheets	
Yellow brass (high)	14.62½
Copper hot rolled	16.25
Lead cut to jobbers	8.25
Zinc, 100-lb. base	9.50
Tubes	
High yellow brass	16.62½
Seamless copper	16.75
Rods	
High yelow brass	13.12½
Copper, hot rolled	13.50
Anodes	
Copper untrimmed	14.00
Wire	
Yellow brass (high)	15.12½

OLD METALS

Deal. buying prices, cents lb.

No. 1 Composition Red Brass	
*New York	5.75- 6.00
*Cleveland	6.50- 6.75
Chicago	6.00- 6.12½
St. Louis	6.00- 6.25
Heavy Copper and Wire	
New York, No. 1	7.00- 7.25
Chicago, No. 1	7.00- 7.25
Cleveland	6.75- 7.00
St. Louis, No. 1	7.00- 7.37½
Composition Brass Borings	
New York	5.00- 5.25
Light Copper	
New York	5.75- 6.00
Chicago	5.50- 5.75
*Cleveland	6.00- 6.25
St. Louis	5.75- 6.00
Light Brass	
Chicago	3.37½-3.62½
Cleveland	3.25- 3.50
St. Louis	3.50- 3.75
Lead	
New York	3.50- 3.75
Cleveland	3.50- 3.75
Chicago	3.37½-3.62½
St. Louis	3.65- 3.75
Zinc	
New York	2.00- 2.25
Cleveland	2.50- 2.75
St. Louis	2.75- 3.00
Aluminum	
*Borings, Cleveland	9.00- 9.50
Mixed, cast, Cleve.	13.25-13.50
Mixed, cast, St. L.	13.00-13.50
*Clips, soft, Cleve.	15.00-15.25
SECONDARY METALS	
Brass ingot, 85-5-5-5	9.50
Stand. No. 12 alum.	17.00-17.50

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	8.50- 9.50
Boston, dock, expt.	9.50- 9.75
Boston, domestic	7.50- 7.75
Buffalo, No. 1	11.75-12.25
Buffalo, No. 2	10.50-10.75
Chicago, No. 1	13.00-13.50
Cleveland, No. 1	12.75-13.25
Cleveland, No. 2	11.75-12.25
Detroit, No. 1	9.50-10.00
Detroit, No. 2	8.50- 9.00
Eastern Pa., No. 1	12.00-12.50
Eastern Pa., No. 2	11.00-11.50
Federal, Ill.	10.00-10.50
Granite City, R. R.	10.50-11.00
Granite City, No. 2	9.25- 9.75
N. Y., deal, No. 2	7.50- 8.00
N. Y., deal. barge	8.50- 9.00
Pitts., No. 1 (R. R.)	14.50-15.00
Pitts., No. 1 (dlr.)	14.00 14.50
Pittsburgh, No. 2	13.00-13.50
St. Louis	9.25- 9.75
Valleys, No. 1	13.50-14.00

COMPRESSED SHEETS

Buffalo, dealers	10.50-10.75
Chicago, factory	12.00-12.50
Chicago, dealer	11.50-12.00
Cleveland	12.25-12.75
Detroit	10.00-10.50
E. Pa., new mat.	11.50-12.00
Pittsburgh	14.25-14.75
St Louis	7.00- 7.50
Valleys	13.00-13.25

BUNDLED SHEETS

Buffalo	8.00- 8.50
Cincinnati, del.	8.00- 8.50
Cleveland	9.75-10.25
Pittsburgh	13.00-13.50
St. Louis	5.50- 6.05

SHEET CLIPPINGS, LOOSE

Chicago	7.50- 8.00
Cincinnati	7.50- 8.00
Detroit	7.50- 8.00
St. Louis	5.00- 5.50

STEEL RAILS, SHORT

Birmingham	12.00-12.50
Buffalo	14.50-15.00
Chicago (3 ft.)	15.00-15.50
Chicago (2 ft.)	15.75-16.25
Cincinnati, del.	14.00-14.50
Detroit	13.50-14.00
Pitts., open-hearth, 3 ft. and less	15.25-15.75
St. Louis, 2 ft. & less	14.00-14.50

STEEL RAILS, SCRAP

Boston	7.50- 7.75
Chicago	13.00-13.25
Pittsburgh	14.00-14.50
St. Louis	11.50-12.00
Buffalo	11.75-12.25

STOVE PLATE

Birmingham	7.00- 7.50
Boston, dealers	4.75- 5.00
Buffalo	10.25-10.75
Chicago	7.00- 7.50
Cincinnati, dealers	7.50- 8.00
Detroit, net	7.00- 7.50
Eastern Pa.	9.50- 9.75
N. Y., deal. fdry.	6.25- 6.75
St. Louis	7.00- 7.50

COUPLERS, SPRINGS

Buffalo	14.50-15.00
Chicago, springs	14.00-14.50
Eastern Pa.	15.50-16.00
Pittsburgh	16.00-16.50
St. Louis	12.00-12.50

ANGLE BARS—STEEL

Chicago	14.00-14.50
St. Louis	12.25-12.75

RAILROAD SPECIALTIES

Chicago	14.00-14.50

LOW PHOSPHORUS

Buffalo, billet and bloom crops	14.50-15.00
Cleveland, billet, bloom crops	16.00-16.50
Eastern Pa., crops	15.50-16.00
Pittsburgh, billet, bloom crops	17.00-17.50
Pittsburgh, sheet bar crops	15.75 16.25

FROGS, SWITCHES

Chicago	13.00-13.50
St. Louis, cut	11.50-12.00

SHOVELING STEEL

Chicago	13.00-13.50
Federal, Ill.	9.75-10.25
Granite City, Ill.	8.75- 9.25

RAILROAD WROUGHT

Birmingham	7.00- 7.50
Boston, dealers	6.00- 6.50
Buffalo, No. 1	10.25-10.75
Buffalo, No. 2	11.75-12.25
Chicago, No. 1, net	10.00-10.50
Chicago No. 2	13.00-13.50
Cincinnati, No. 2	10.50-11.00
Eastern Pa.	12.50-13.00
N. Y., No. 1, deal.	9.50-10.00
St. Louis, No. 1	7.75- 8.25
St. Louis, No. 2	10.50-11.00

SPECIFICATION PIPE

Eastern Pa.	10.50
New York, dealers	3.50- 4.00

BUSHELING

Buffalo, No. 1	10.25-10.75
Chicago, No. 1	11.50-12.00
Cinci., No. 1, deal.	7.50- 8.00
Cincinnati, No. 2	4.50- 5.00
Cleveland, No. 2	7.50- 8.00
Detroit, No. 1, new	9.50-10.00
Valleys, new, No. 1	12.75-13.00

MACHINE TURNINGS

Birmingham	4.00- 4.50
Boston, dealers	3.25- 3.50
Buffalo	5.75- 6.25
Chicago	7.50- 8.00
Cincinnati, dealers	6.00- 6.50
Cleveland	7.00- 7.50
Detroit	5.50- 6.00
Eastern Pa.	7.50- 8.00
New York, dealers	3.50- 4.00
Pittsburgh	9.75-10.25
St. Louis	3.25- 3.75
Valleys	9.00- 9.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston, dealers	2.50- 2.75
Buffalo	7.75- 8.25
Cincinnati, dealers	5.50- 6.00
Cleveland	7.50- 8.00
Detroit	5.50- 6.00
Eastern Pa.	6.00- 6.50
New York, dealers	2.00- 2.50
Pittsburgh	8.00- 9.00

CAST IRON BORINGS

Birmingham, plain	4.00- 4.50
Boston, chemical	5.50- 6.50
Boston, dealers	3.25- 3.50
Buffalo	7.75- 8.25
Chicago	6.00- 6.50
Cincinnati, dealers	5.50- 6.00
Cleveland	7.50- 8.00
Detroit	5.50- 6.00
E. Pa., chemical	10.00-12.00
New York, dealers	2.00- 2.50
St. Louis	3.75- 4.25

PIPE AND FLUES

Cincinnati, dealers	7.00- 7.50

RAILROAD GRATE BARS

Buffalo	8.50- 9.00
Chicago, net	7.50- 8.00
Cincinnati	6.00- 6.50
Eastern Pa.	9.50- 9.75
New York, dealers	5.00- 5.25
St. Louis	5.00- 5.50

FORGE FLASHINGS

Boston, dealers	6.25- 6.50
Buffalo	10.50-11.00
Cleveland	11.00-11.50
Detroit	9.00- 9.50
Pittsburgh	13.00-13.50

FORGE SCRAP

Boston, dealers	4.50- 5.00
Chicago, heavy	14.00-14.50
Eastern Pa.	12.25-12.75

ARCH BARS, TRANSOMS

St. Louis	12.25-12.75

AXLE TURNINGS

Boston, dealers	3.75- 4.25
Buffalo	10.50-11.00
Chicago, elec. fur.	12.50-13.00
Eastern Pa.	11.00
St. Louis	8.50- 9.00

STEEL CAR AXLES

Birmingham	12.00-12.50
Boston, ship. point.	10.50-11.00
Buffalo	14.50-15.00
Chicago, net	14.50-15.00
Eastern Pa.	17.00
St. Louis	12.75-13.25

SHAFTING

Boston, ship point.	13.00-13.25
Eastern Pa.	18.50
New York, dealers	13.50-14.00
St. Louis	13.00-13.50

CAR WHEELS

Birmingham	9.00- 9.50
Boston, iron deal.	7.00- 7.75
Buffalo, iron	11.00-11.50
Buffalo, steel	14.50-15.00
Chicago, iron	13.00-13.50
Chicago, rolled steel	14.00-14.50
Cincinnati, iron	10.50-11.00
Eastern Pa., iron	13.50
Eastern Pa., steel	15.50-16.00
Pittsburgh, iron	14.00-14.50
Pittsburgh, steel	15.75-16.25
St. Louis, iron	10.25-10.75
St. Louis, steel	12.00-12.50

NO. 1 CAST SCRAP

Birmingham	9.00- 9.50
Boston, No. 1 mach.	9.00- 9.25
Boston, No. 2	8.25- 8.50
Boston, tex. con.	8.50- 9.00
Buffalo, cupola	11.50-12.00
Buffalo, mach.	12.50-13.00
Chicago, agri. net	10.00-10.50
Chicago, auto	11.00-11.50
Chicago, mach. net	12.00-12.50
Chicago, railr'd net	10.50-11.00
Cinci., mach. cup	10.50-11.00
Cleveland, cupola	12.75-13.25
Detroit, net	11.50-12.00
Eastern Pa., cupola	12.50-13.00
E. Pa., mixed yard	10.50
Pittsburgh, cupola	13.75-14.25
San Francisco, del.	13.50-14.00
Seattle	7.50- 9.00
St. Louis, No. 1	10.75-11.25
St. L., No. 1 mach.	12.50-13.00

HEAVY CAST

Boston, del.	6.75- 7.00
Buffalo, break.	10.25-10.75
Cleveland, break	10.50-11.00
Detroit, No. 1, mach. net	12.00-12.50
Detroit, break.	9.00- 9.50
Detroit, auto net	11.50-12.00
Eastern Pa.	12.00-12.50
N. Y., break. deal.	7.50- 8.00
Pittsburgh	12.50-13.00

MALLEABLE

Birmingham, R. R.	11.50-12.50
Boston, consum.	13.50-14.50
Buffalo	14.50-15.00
Chicago, R. R.	15.75-16.25
Cincinnati, agri. del.	11.50-12.00
Cleveland, rail	16.00-16.50
Detroit, auto net	13.00-13.50
Pittsburgh, rail	16.50-17.00
St. Louis, R. R.	13.75-14.25
Eastern Pa., R. R.	15.00-15.50

RAILS FOR ROLLING

5 feet and over

Birmingham	10.50-11.00
Boston, dealers	8.00- 8.50
Buffalo	12.00-12.50
Chicago	14.00-14.50
Eastern Pa.	13.00-14.00
New York, dealer	10.50-11.00
St. Louis	13.50-14.00

LOCOMOTIVE TIRES

Chicago (cut)	14.00-14.50
St. Louis, No. 1	11.75-12.25

LOW PHOS. PUNCHINGS

Buffalo	14.50-15.00
Chicago	15.50-16.00
Eastern Pa.	15.00-15.50
Pittsburgh (heavy)	16.00-16.50
Pittsburgh (light)	15.50 16.00

Iron Ore

Lake Superior Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63% con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-60% (nom.)	10.00-10.50

Foreign Ore

Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	10.50
No. Afr. low phos.	10.50
Swedish basic, 65%	9.50
Swedish low phos.	10.50
Spanish No. Africa basic, 50 to 60%	10.50
Tungsten, spot sh. ton unit, duty pd.	$15.50-16.00
N. F. fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	19.25

Manganese Ore

(Nominal)

Prices not including duty, cents per unit cargo lots

Caucasian, 52-55%	26.00
So. African, 52%	26.00
So. Afr., 49-51%	24.00
Indian, 58-60%	nominal
Indian, 48-50%	nominal

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS	
Baltimore*	3.00c
Boston††	3.00c
Buffalo	3.00c
Chattanooga	3.36c
Chicago (j)	3.00c
Cincinnati	3.22c
Cleveland	3.00c
Detroit	3.09c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.06c
New Orleans	3.35c
New York‡(d)	3.31c
Pitts. (h)	2.95c-3.10c
Philadelphia*	3.03c
Portland	3.70c
San Francisco	3.50c
Seattle	3.70c
St. Louis	3.25c
St. Paul	3.25c-3.40c
Tulsa	3.25c
IRON BARS	
Portland	3.40c
Chattanooga	3.36c
Baltimore*	3.05c
Chicago	2.75c
Cincinnati	3.22c
New York‡(d)	3.36c
Philadelphia*	2.93c
St. Louis	3.20c
Tulsa	3.25c
REINFORCING BARS	
Buffalo	2.60c
Chattanooga	3.36c
Chicago	2.10c-2.60c
Cleveland (c)	2.10c
Cincinnati	3.25c
Houston	3.25c
Los Ang., cl.	2.45c
New Orleans	3.50c
Pitts., plain (h)	3.05c
Pitts., twisted squares (h)	3.175c
San Francisco	2.45c
Seattle	2.45c
St. Louis	3.25c
Tulsa	3.25c
Young.	2.30c-2.60c
SHAPES	
Baltimore*	3.00c
Boston††	3.19c
Buffalo	3.25c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.42c
Cleveland	3.31c
Detroit	3.42c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.31c
New Orleans	3.55c
New York (d)	3.46c
Philadelphia*	2.98c
Pittsburgh(h)	3.15c
Portland (i)	3.70c
San Francisco	3.50c
Seattle (i)	3.70c
St. Louis	3.45c
St. Paul	3.45c
Tulsa	3.50c
PLATES	
Baltimore*	3.00c
Boston††	3.21c
Buffalo	3.37c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.42c
Cleveland, ¼-in. and over	3.31c
Detroit	3.42c
Detroit, ⅜-in.	3.65c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.31c
New Orleans	3.55c
New York (d)	3.40c
Philadelphia*	2.98c
Phila. floor	4.95c
Pittsburgh(h)	3.15c
Portland	3.55c
San Francisco	3.50c
Seattle	3.55c
St. Louis	3.45c
St. Paul	3.45c
Tulsa	3.50c
NO. 10 BLUE	
Baltimore*	3.10c
Boston††	3.30c
Buffalo	3.62c
Chattanooga	3.36c
Chicago	3.05c
Cincinnati	3.22c
Cleveland	3.11c
Det., 8-10 ga.	3.14c
Houston	3.35c
Los Angeles	3.70c
Milwaukee	3.16c
New Orleans	3.55c
New York	3.31c
Portland	3.75c
Philadelphia*	3.08c
Pittsburgh(h)	2.95c
San Francisco	3.60c
Seattle	3.75c
St. Louis	3.45c
St. Paul	3.30c
Tulsa	3.70c
NO. 24 BLACK	
Baltimore*†	3.60c
Boston (g)	2.95c
Buffalo	3.25c
Chattanooga	4.16c
Chicago	3.85c
Cincinnati	4.02c
Cleveland	3.91c
Detroit	3.94c
Los Angeles	4.35c
Milwaukee	3.96c
New Orleans	4.50c
New York	3.89c
Philadelphia*†	3.60c
Pitts.** (h)	3.55c
Portland	4.40c
San Francisco	4.25c
Seattle	4.40c
St. Louis	4.10c
St. Paul	3.90c
Tulsa	4.75c
NO. 24 GALV. SHEETS	
Baltimore*†	4.30c
Buffalo	4.00c
Boston (g)	4.65c
Chattanooga	4.86c
Chicago (h)	4.55c
Cincinnati	4.72c
Cleveland	4.61c
Detroit	4.72c
Houston	4.40c
Los Angeles	4.95c
Milwaukee	4.66c
New Orleans	4.95c
New York	4.50c
Philadelphia*†	4.40c
Pitts.** (h)	4.15-4.45c
Portland	5.00c
San Francisco	5.00c
Seattle	5.00c
St. Louis	4.65c
St. Paul	4.50c
Tulsa	5.10c
BANDS	
Baltimore*	3.20c
Boston††	3.30c
Buffalo	3.42c
Chattanooga	3.61c
Chicago	3.30c
Cincinnati	3.47c
Cleveland	3.36c
Detroit, ⅜-in. and lighter	3.39c
Houston	3.25c
Los Angeles	4.10c
Milwaukee	3.41c
New Orleans	3.95c
New York (d)	3.56c
Philadelphia	3.18c
Pittsburgh (h)	3.20c
Portland	4.25c
San Francisco	4.10c
Seattle	4.25c
St. Louis	3.55c
St. Paul	3.55c
Tulsa	3.45c
HOOPS	
Baltimore	2.30c
Boston	4.30c
Buffalo	3.42c
Chicago	3.30c
Cincinnati	3.47c
Det., No. 14 and lighter	3.39c
Los Angeles	5.85c
Milwaukee	3.41c
New York	3.56c
Philadelphia	3.43c
Pittsburgh (h)	3.70c
Portland	5.60c
San Francisco	6.15c
Seattle	5.60c
St. Louis	3.55c
St. Paul	3.55c
COLD FIN. STEEL	
Baltimore (c)	3.58c
Boston	3.75c
Buffalo (h)	3.40c
Chattanooga*	3.98c
Chicago (h)	3.35c
Cincinnati	3.57c
Cleveland (h)	3.35c
Detroit	3.49c
Los Ang. (f) (d)	5.85c
Milwaukee	3.46c
New Orleans	4.15c
New York	3.81c
Philadelphia	3.61c
Pittsburgh	3.20c
Portland (f) (d)	6.00c
San Fran.(f) (d)	5.80c
Seattle (f) (d)	6.00c
St. Louis	3.60c
St. Paul	3.87c
Tulsa	4.50c
COLD ROLLED STRIP	
Boston, 0.100-in., 500 lb. lots	3.245c
Buffalo	3.39c
Chicago	3.27c
Cincinnati (b)	3.22c
Cleveland (b)	3.20c
Detroit	3.33c
New York	3.36c
St. Louis	3.45c

TOOLS STEELS

(Applying on or east of Mississippi river; west of Mississippi 1c up)

	Base
High speed	57c
High carbon, high chrome	37c
Oil hardening	22c
Special tool	20c
Extra tool	17c
Regular tool	14c

Uniform extras apply.

BOLTS AND NUTS

(100 pounds or over)

	Discount
Chicago (a)	70
Cleveland	70
Detroit	70-10
Milwaukee	70
Pittsburgh	70

(a) Under 100 pounds, 65 off.

(b) Plus straightening, cutting and quantity differentials; (c) Plus mill, size and quantity extras; (d) Minus quant. diff.; (e) New mill classif. (f) Rounds only; (g) 50 bundles or over; (h) Outside delivery, 10c less; (i) Under 3 inches; (j) shapes other than rounds, flats, fillet angles, 3.15c.

‡Domestic bars; *Plus quan. extras; **Under 25 bundles; *†50 or more bundles; †New extras apply; ††Base 40,000 lbs., extras on less.

Prices on heavier lines are subject to new quantity differentials: 399 lbs. and less, up 50 cts.; 400 to 9999 lbs., base; 10,000 to 19,999 lbs., 15 cts. under; 20,000 to 39,999 lbs., 25 cts. under; 40,000 lbs. and over, 35 cts. under base.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Dec. 19

Export Prices f. o. b. Ship at Port of Dispatch—(By Cable or Radio)

	British gross tons U. K. ports £ s d	Continental Channel or North Sea ports, metric tons Quoted in dollars at current value	Continental Channel or North Sea ports, metric tons **Quoted in gold pounds sterling £ s d
PIG IRON			
Foundry, 2.50-3.00 Silicon	$15.37 3 2 6	$14.51	1 15 0
Basic bessemer	15.37 3 2 6*	12.70	1 11 0
Hematite, Phos. .03-.05	16.00 3 5 0	.....	.....
SEMIFINISHED STEEL			
Billets	$27.06 5 10 0	$19.02	2 7 0
Wire rods, No .5 gage	41.82 8 10 0	36.44	4 10 0
FINISHED STEEL			
Standard rails	$40.59 8 5 0	$44.53	5 10 0
Merchant bars	1.64c 7 10 0	1.15c to 1.20c	3 2 6 to 3 5 0
Structural shapes	1.64c 7 10 0	1.14c	3 1 6
Plates, †¼ in. or 5 mm.	1.77c 8 1 3	1.56c	4 5 0
Sheets, black, 24 gage or 0.5 mm	2.08c 9 10 0	2.13c	5 16 0††
Sheets, gal., 24 gage, corr.	2.51c 11 10 0	2.19c	6 0 0
Bands and strips	1.86c 8 10 0	1.46c	4 0 0
Plain wire, base	2.03c 9 5 0	1.91c	5 5 0
Galvanized wire, base	2.36c 10 15 0	2.15c	5 17 6
Wire nails, base	2.63c 12 0 0	1.73c	4 15 0
Tin plate, box 108 lbs.	$4.62 0 18 9	.....	.....

British ferromanganese $85 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d ($43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	£ s d		French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$17.22	3 10 0(a)	$17.13	260	$12.85	385	$25.36 63
Basic bessemer pig iron	17.22	3 10 0(a)	12.52	190	11.83	350	27.97(b) 69.50
Furnace coke	4.56	0 18 6	6.26	95	3.89	115	7.65 19
Billets	27.06	5 10 0	28.34	430	18.25	540	38.85 96.50
Standard rails	1.81c	8 5 0	2.08c	694	1.65c	1,100	2.42c 132
Merchant bars	1.90c	8 12 0	1.68c	560	90c	600	2.01c 110
Structural shapes	1.92c	8 15 0	1.65c	550	90c	600	1.97c 107.50
Plates, †¼-in. or 5 mm.	1.99c	9 1 3	2.10c	700	1.05c	700	2.32c 127
Sheets, black	2.47c	11 5 0§	1.69c	575‡	1.24c	825‡	2.64c 144‡
Sheets, galv., corr., 24 ga. or 0.5 mm	2.91c	13 5 0	3.00c	1,000	2.25c	1,500	6.77c 370
Plain wire	2.05c	9 5 0	2.64c	900	1.73c	1,150	3.17c 173
Bands and strips	2.05c	9 7 0	1.95c	650	1.26c	840	2.32c 127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. a del. Middlesbrough. b hematite. ††Close annealed.

**Gold pound sterling carries a premium of 66.25 per cent over paper sterling.

Bars

Bar Prices, Page 56

Pittsburgh—Compared with October and November, December business in merchant steel bars has declined slightly. Contrary to some price weakness which has developed in sheets and strip in the delivered Detroit market, bars are firm at 1.85c, base, Pittsburgh, or 2.00c, delivered, Detroit metropolitan district.

Cleveland—Specifications for steel bars moderated slightly during the week though still among the most active of finished steel products. Agricultural implement manufacturers are going into spring production schedules with practically no interruption from the high average rate maintained during the fall months, and some of these interests are predicting the highest output on record for the industry as a whole in 1936.

Chicago—Bar demand shows little tendency to recede. Aided by active specifications from the automotive and farm implement industry, business compares favorably with the rate of the preceding several weeks. Buying is for relatively early requirements, indicative of the manner in which consumption is being maintained. A pick-up in orders from the farm implement industry is in prospect since this group is expected to be more active shortly in production of spring tools.

Boston—Until after the holiday and inventory season, commercial steel bar sellers here expect relatively little activity, but anticipate a good first quarter business, as stocks at many consuming plants are unusually low. Prices are unchanged.

New York—Commercial steel bar sellers look for improvements after the first of the year to follow the rather lean period experienced in recent weeks. A number of smaller consumers stocked rather substantially prior to the revision in prices Oct. 1 and it is believed their supplies will be well reduced by the end of the year. However, sellers report better releases than a year ago.

Philadelphia—Steel bars are being contracted for first quarter in increasing volume. Sentiment is mixed in regard to possible advances early in the year but a growing disposition is evident among consumers to seek protection.

Cold Finished

Cold Finished Prices, Page 57

Pittsburgh—The recent $3 per ton increase in cold-finished steel bars, accompanied by a $3 per ton cut in chemical extras, places the market in the same position as before the move was taken. Therefore, with no net change in the price of cold-drawn bars, excepting shafting, which does not carry chemical extras, there is no incentive for consumers to stock before the general application date, Jan. 1. In the meantime a little January buying has appeared. But automotive buyers are more cautious. The base price on cold-drawn bars holds at 1.95c until Jan. 1, when the Pittsburgh base advances to 2.10c.

Plates

Plate Prices, Page 56

Pittsburgh—Ten steel river barges requiring a total of 2118 tons of plates were let last week, details of which are given below. Dravo Contracting Co., Neville Island, Pa., took an order last week from the Monongahela & Ohio Dredging Co. for construction of a steel hull, 90 x 22 x 5 feet. Pittsburgh-Des Moines Steel Co. has been fabricating a steel water tank at its Neville Island, Pa., plant for use at the Dover, O., reservoir, where the tracks of the Wheeling & Lake Erie railroad are being relocated. Plates are quoted 1.80c, base, Pittsburgh.

Cleveland—Railroads here have not yet placed contracts for plates and other materials for first quarter, although their requirements are expected to be heavier than in 1935. Erie railroad's inquiry asks for prices for first half, but producers are not quoting beyond March. Demand from boiler and tank fabricators is slow, and plate orders generally are restricted to carload lots.

Chicago—Best outlets for plates continue among structural fabricators and railroad shops. Railroad repair material is being ordered at a faster rate, and although only small lots are being taken for new equipment building, the outlook in this direction is the best in several years. Among miscellaneous consumers, the lighter gages are in best demand. Moderate lots are being specified for tank work. Purchases of municipal tanks continue light, though bids recently have been taken on a fairly large number.

New York—The plate market is closing the year rather actively, with a substantial tonnage pending for shipwork and oil tanks. The Newport News Shipbuilding & Dry Dock Co., Newport News, Va., with purchasing offices in New York, is expected to close shortly on possibly 8000 tons of plates in addition to 4000 tons of shapes and bars for the liner to be built for the International Mercantile Marine-Roosevelt Steamship Co. United Dry Docks Inc., this city, has been awarded construction of all three municipal ferryboats on which bids were opened recently. Approxmately 3000 tons of plates, 1500 tons of shapes and bars, will be required for these three boats. Plate sellers are also awaiting developments in plain material for cars for the Pennsylvania. Bids were opened by the New York Central under the Clayton act Dec. 18 on first quarter requirements of plates, shapes, bars and miscellaneous steel products.

Philadelphia—Plate consumers are contracting more freely for first quarter as protection against possible price advances during that period. Sun Shipbuilding Co., Chester, Pa., is expected to receive a formal contract shortly for two tankers for Socony Vacuum Oil Co., New York, involving a total of approximately 10,000 tons of hull steel. Bids on a ferry boat for navy have been postponed until early next year.

San Francisco—Interest continues to center around the opening of bids Jan. 7 for 44,000 tons for 16.47 miles of large diameter pipe for the metropolitan water district, Los Angeles. To date this year 51,781 tons have been placed, compared with 62,406 tons for the same period a year ago.

Seattle—Fabricating plants are not sharing increased demand for steel products. Recent contracts have been small, mainly tank and water tower work. Seattle light department is calling bids Dec. 23 for small steel plate job on the Diablo power plant penstocks.

Contracts Placed

1800 tons, six tanks, long Beach, Calif., to Western Pipe & Steel Co., San Francisco. 208 tons, specification 649, and 182 tons, specification 630, Seminoe dam, Casper, Wyo., to unnamed interest.

1650 tons, 36-inch, welded steel pipe, treasury department, Berkeley, Calif., to Steel Tank & Pipe Co., Berkeley, Calif.

540 tons, barge for Hawaiian Pineapple Co., Honolulu, T. H., to Bethlehem Shipbuilding Co., San Francisco.

200 tons, repairs to steamers THOMAS WALTERS and WILLIS L. KING, to Jones & Laughlin Steel Corp., Pittsburgh.

Contracts Pending

41,600 tons, welded steel pipe, specification 137, metropolitan water district, Los Angeles; bids opened.

8000 tons, liner, for International Mercantile Marine-Roosevelt Steamship Co., New York, to Newport Shipbuilding & Dry Dock Co., Newport News, Va.; 4000 tons of shapes and bars also required.

3000 tons, three municipal ferry boats, New York, to United Dry Docks Inc., New York; 1500 tons of shapes, bars and other steel products required.

1800 tons, six tanks for Long Beach, Calif.; bids opened.

1700 tons, 36-inch welded steel or cast iron pipe, Sheridan, Wyo.; bids opened.

1200 tons, four 195 x 35 x 9½-foot steel barges, each with a capacity of 8600 barrels, arc-welded type, for Campbell Transportation Co., Pittsburgh, to McClintic-Marshall Corp., Bethlehem, Pa., at an estimated cost of about $200,000.

1100 tons, three 80,000-barrel floating-roof tanks, Barber Asphalt Co., Maurer, N. J., to Chicago Bridge & Iron Works, Chicago.

1000 tons, 12 to 30-inch welded steel pipe, Chandler Heights citrus irrigation district, Highley, Ariz.; bids opened.

918 tons, six 175 x 26 x 11-foot standard steel coal barges, for Tri-State Transportation Inc., Morgantown, W. Va., to American Bridge Co., Pittsburgh.

110 tons, roof plates and top ring for tank, Gulf Refining Co., Fayetteville, N. C., to Chattanooga Boiler Works, Chattanooga, Tenn.

Sheets

Sheet Prices, Page 56

Pittsburgh — Sheet buying is steady. While the majority of sales are closed at the full market price, there has been some active solicitation of important Detroit district accounts at $3 a ton under the market, not only for immediate specification, but for first quarter shipment. Average of operations in the sheet mills last week was around 70-75 per cent, with production in common black and full-finished leading other grades.

Cleveland—Demand from the automobile industry and manufacturers of household utilities still is strong, although a slight easing in specifications was noted during the week attributed to the approach of the holidays and inventories. Ford plants are reported congested with material and shipments to them have slowed up. Mills have substantial backlogs for January. Prices are steady.

Chicago—After holding at an unusually active rate for several weeks, sheet demand is commencing to feel the effects of the season and specifications are slightly smaller. The decrease, however, has been less than usually experienced in December and a pick-up is looked for after the holidays. Operations continue heavy, since mills have fairly large backlogs. Active automotive schedules continue to account for a large share of current shipments. While some new business is being received for January delivery, smaller consumers generally are ordering for only early needs.

Boston—Specifications are lighter. A considerable amount of sheets are being fabricated, especially by automobile accessory manufacturers, but the tendency is toward a general letdown until after Jan. 1.

New York—Sheet demand is slower. Approaching holidays and inventories are causing consumers to restrict specifications as much as possible. Prices are steady.

Philadelphia — Distribution of sheet tonnage for Pennsylvania railroad's 10,000 freight cars is the largest single item in the market here, with formal contracts expected to be announced momentarily. Good contracting for first quarter still is noted. Rumors still are persistent, but unconfirmed, that there will be a price advance in the first quarter.

Buffalo—Sheet mills will operate at 90 per cent right up to the Christmas holiday and will resume at that rate Dec. 26. The outlook for January is good.

Detroit—Reductions of $3 a ton in Detroit delivered prices on black sheets are now being made freely by producers to the larger users. This follows on a weakening tendency first in evidence about a month ago. The full market still is applied in many instances to smaller tonnages, but most producers are meeting the $3 a ton cut on the larger accounts. On a delivered basis the minimum on black sheets now is 2.45c, Detroit; No. 10 gage cold rolled, 2.55c, delivered, Detroit; and No. 20 gage cold rolled, 3.00c, delivered here.

Cincinnati—Sheet orders for first quarter have not reached the peaks of fourth quarter business, but assure continued operations well into January at near capacity. Although talk of a price increase persists, little speculative buying has developed.

St. Louis—Some recession in new buying of sheets is reported by producers and distributors. The decline is ascribed to inventory and other seasonal influences. The movement, however, continues in substantial volume.

Transportation

Track Material Prices, Page 57

With recent placement of orders for 10,000 freight cars by the Pennsylvania, two ten-car diesel-electric passenger trains by the Union Pacific, inquiry by the Southern Pacific for 40,769 tons of rails and many smaller projects awarded or actively pending this department of the steel industry is busy. At the moment nothing new is appearing, either in rails or rolling stock. Programs by several roads will bring additional requirements forward early in the year.

The Pennsylvania has placed an order with the Westinghouse Air Brake Co., Wilmerding, Pa., for 10,000 complete sets of air brake equipment for the freight cars now under construction. A new type of brake recently introduced has been specified.

Atchison, Topeka & Santa Fe has approved its 1936 budget for $28,408,973, including 500 box cars and 50 hopper cars, car and locomotive repairs, rails and fastenings.

New York Central is expected to issue its inquiry soon for 30,000 to 40,000 tons of rails and sufficient fastenings to lay them.

The Nickel Plate is asking bids by Dec. 23 on 117,000 second-hand tie plates, punched or re-punched, for 90-pound rails. Tie plates are to be furnished in four classes, both flat and canted, and prices are asked f.o.b. tracks at Fostoria, O., and Muncie, Ind.

Demands for railroad spikes for shipment before Jan. 1 have been so heavy by railroads seeking to avoid the increase effective then that substantial lots are being declined by producers, due to inability to make shipments this year.

The Grand Trunk is placing steel for the rebuilding of 600 steel hopper cars.

Car Orders Placed

Bartex Pipe Line Co., 20 tank cars, 50 tons capacity, to General American Tank Car Corp., Chicago.

Locomotives Placed

Peoria & Pekin Union, one 600-horsepower, diesel switching locomotive to American Locomotive Co., New York.

Car Orders Pending

Atchison, Topeka & Santa Fe, 500 50-ton single sheathed box cars, and 50 70-ton hopper cars, approved in 1936 budget.

Pipe

Pipe Prices, Page 57

Pittsburgh—Several producers are taking the coming week for needed rehabilitation and repairs to mills, and have built up representative mill stocks, to care for current demands over the next week or two. Small-sized orders for tubular products are the most prevalent.

Chicago—While the recent rush in taking of bids on cast pipe for various types of municipal work is subsiding, a large tonnage on which bids have been taken remains to be placed. Specifications have been revised on a number of PWA projects, and new bids are to be submitted. Orders have been heavier lately and December business gives indications of being near the peak for the year. Prices are unchanged.

St. Louis—Laclede Tube Co. has been awarded 1500 tons of 1-inch

light wall steel tubing to be used in cooling concrete in the Grand Coulee dam. The contract includes 8714 bends for the tubing. Even bids were entered by L. R. Flori Co., St. Louis, and Laclede Tube, and by lot the contract was awarded to the former. Flory company announced that Laclede would fabricate the pipe.

Birmingham, Ala.—Numerous contracts have been received for varied sizes of cast pipe, and active operations over the next four months appear likely.

San Francisco — Pending business, which probably will be placed before Dec. 31, aggregates over 9500 tons. Awards for the past week totaled 1609 tons, bringing total bookings so far this year to 36,632 tons, compared with 42,925 tons for the like period in 1934. Bids have been opened on 4300 tons of 16-inch cast pipe for Sheridan, Wyo., alternate figures having been taken on welded steel pipe.

Seattle—Demand for cast pipe is active, tonnages pending being the largest of the year. United States Pipe & Foundry Co., Burlington, N. J., has been awarded 600 tons, class 150, 6, 12 and 20-inch for Eugene, Oreg. Reclamation bureau has awarded to L. R. Flori Co., St. Louis, 3,000,000 feet of 1-inch steel pipe for Coulee, Wash., dam.

Cast Pipe Placed

2700 tons, 8-inch, Los Angeles, 900 tons to United States Pipe & Foundry Co., Burlington, N. J.; 1350 tons to American Cast Iron Pipe Co., Birmingham, Ala.; and 450 tons to National Cast Iron Pipe Co., Birmingham.

1283 tons, 16-inch, San Francisco, to United States Pipe & Foundry Co., Burlington, N. J.

850 tons, 8 to 16-inch, Oakland, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

600 tons, class 150, 6, 12 and 20-inch, Eugene, Oreg., to United States Pipe & Foundry Co., Burlington, N. J.

100 tons, class 250 and 150, 6, 12 and 16-inch, Seattle, to United States Pipe & Foundry Co., Burlington, N. J.

218 tons, 6 and 8-inch, Sherman system, Beverly Hills, Calif., to National Cast Iron Pipe Co., Birmingham, Ala.

159 tons, 4 to 8-inch, San Bernardino, Calif., to National Cast Iron Pipe Co., Birmingham, Ala.

130 tons, 6-inch, water department, Los Angeles, to unnamed interest.

108 tons, 2 to 6-inch, South Lagunda, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

Steel Pipe Placed

1500 tons, 3,000,000 feet of 1-inch, for cooling concrete at Coulee, Wash., dam, to Laclede Tube Co., through L. R. Flori Co., St. Louis.

Cast Pipe Pending

4300 tons, 16-inch, cast iron or welded steel, Sheridan, Wyo.; bids opened.

730 tons, 6 and 8-inch, DeLake water district, Nelscott, Oreg.; B. L. Ashton, Lebanon, Oreg., low.

550 tons, 4 to 14-inch, Watsonville, Calif.; Union Paving Co., San Francisco, low.

393 tons, 8, 10 and 12-inch, Enumclaw, Wash.; Herber & Sheldon, Tacoma, general contractor.

100 tons, 2 to 4-inch, Plymouth, Utah; bids opened.

250 tons, 4, 6 and 8-inch, Ridgefield, Wash.; Parker-Schram Co., Portland, general contractor.

235 tons, 4, 6 and 8-inch, Snohomish, Wash.; Queen City Construction Co., Seattle, low.

160 tons, 6-inch, Eatonville, Wash.; D. Coluccio, Seattle, general contractor.

Wire

Wire Prices, Page 57

Pittsburgh—Wire producers here have announced spring terms on farm and poultry fence in lots of 500 rods or more, lawn fence in 300 rods or more, with 500 or more steel posts, and on stretchers and fence tools when shipped in connection with the above required quantities as follows: Four per cent discount for cash if paid on or before Jan. 10, 1936; the discount decreasing ½ per cent each month thereafter to 2 per cent May 10.

The merchant wire consuming trade is now generally posted on the changes announced ten days ago on new less-carload quantities.

Cleveland—Business in wire and wire products is holding up much better than expected. Only slight retardation is noted in manufacturers' specifications, while jobbers are preparing to replenish stocks. The usual spring terms on farm requirements have been announced, except that the periods for discounts have been extended 30 days, thus favoring buyers.

Chicago—Steel wire demand unexpectedly has improved recently, offsetting the lull which developed early in December. In the absence of a price incentive for consumers to order ahead, recent buying is taken as an indication of active consumption. Automotive requirements continue heavy, while operations of miscellaneous users of manufacturers' wire are fairly steady. Rescinding of the price differential plan on wire products restores quotations on these items to their former levels with the exception of wire fencing which has been revised from $60 to $63, Chicago, per base column.

Tin Plate

Tin Plate Prices, Page 56

Pittsburgh—Tin plate production continued last week at 80 per cent, but this week extensive shutdowns will occur following the distribution of a tin mill payroll which will be the highest since 1929. Most of current production is against 1936 orders, but in addition, producers still hold a large stock of unshipped tin plate. The plate holds at $5.25 per base box.

Strip Steel

Strip Prices, Page 57

Pittsburgh—In competition with lower prices on cold-rolled sheets, the 2.60c, Pittsburgh or Cleveland, market on cold-rolled strip has met certain price concessions offered in the Detroit market. On a large volume of small-lot business, however, the full market is reported as applying, and a firm market continues in hot-rolled strip at 1.85c, Pittsburgh. Rolling against orders for January shipment, strip producers last week were running at 60 to 65 per cent of hot and cold mill capacity.

Cleveland—Specifications for strip from automobile manufacturers are slower in reaching mills. While leading makers report they are booked full for three weeks, most makers can take additional tonnage for shipment in January. Purchases by other consumers are light.

Chicago—Strip steel demand is declining though at a slower rate than would be expected normally for December. Active automotive requirements tend to temper the decrease in total business, though miscellaneous consumers also are taking shipments at a heavy pace. Users' inventories, in most instances, are only moderate and this is aiding current specifications. New business is restricted to relatively early needs.

New York—With the holiday and inventory season at hand, strip sellers look for increasingly spotty specifications for the next fortnight. They are generally encouraged, however, by the outlook for January. Albany Steel & Iron Supply Co., Albany, N. Y., has been awarded the contract by the state of New York for automobile license tags for 1936, requiring 1650 tons of steel strip. It is understood material will be supplied by Youngstown Sheet & Tube Co., Youngstown, O.

Semifinished

Semifinished Prices, Page 57

Producers of semifinished steel are holding firmly to $2 a ton advance for first month, but will accept specifications at the lower present market up to Dec. 31. Shipments against these specifications will be permitted through January.

Shapes

Structural Shape Prices, Page 56

New York—While contracts placed during the week were relatively small, considerable tonnage is being figured, and fabricators anticipate substantial buying after Jan. 1. Recent inquiries include 1100 tons for a viaduct between Paul and Jerome avenues, New York, and 650 tons for a bridge at North Merrick, N. J.

Pittsburgh — New shape inquiry is led by a 4000-ton assembly plant at Los Angeles for the Chevrolet Motor Co., Detroit. Contracts placed during the week ran largely to state highway bridges. The market is fairly steady at 1.80c, base, Pittsburgh.

Cleveland—The market is fairly active, chiefly in small lots for remodelings and extensions. The Austin Co., Cleveland, placed 500 tons with Carnegie-Illinois Steel Corp., for the Continental Can Co.'s building, Baltimore. Timken Roller Bearing Co., Canton, O., took bids last week on 200 tons for a building. Toledo board of education awarded 900 tons for schools to local fabricators, including several projects to the Art Iron & Wire Works, Toledo. Some delay is being encountered in awarding the Cleveland PWA school projects, pending an inquiry into general contractors' bids.

Chicago — Structural awards are heavier, aided by 3390 tons for the Torrence avenue bridge here. Illinois has taken bids on about 2300 tons for various state bridges which are expected to be placed shortly. A fairly large tonnage is involved in other public work, principally bridges. Several large industrial plant building programs have been announced for this district and plans for this work are looked for soon.

Boston—Structural buying is restricted, although a fairly good number of small miscellaneous tonnages are pending, principally for public projects. Fabricators generally look for an expanding volume in business after the turn of the year.

Philadelphia—Considerable structural tonnage is pending, but orders generally are small. Ludlow Mfg. Co., Edgmoor, Del., has placed 700 tons for another manufacturing plant.

Seattle—General contracts have been awarded for a number of important public works jobs, and fabricators are awaiting action on their bids. Before the end of the month awards, it is expected, will approximate 10,000 tons in the Pacific Northwest.

San Francisco—Shape awards in the week were the highest since the latter part of October and aggregated 3609 tons, bringing the total for the year to 117,083 tons, as compared with 139,534 tons for the corresponding period in 1934. Over 30 bridge and grade separation projects now pending will require more than 10,000 tons.

Shape Contracts Placed

3390 tons, Torrence avenue bridge, Chicago ,to American Bridge Co., Pittsburgh.

2125 tons, convention hall, Oklahoma City, Okla., to the J. B. Klein Iron & Foundry Co., that city.

1770 tons, six state highway bridges, Nebraska; four involving 1130 tons, to Omaha Steel Works, Omaha, Nebr.; two, involving 640 tons, to McClintic-Marshall Corp., Bethlehem, Pa.

1160 tons, buildings, United States Pipe & Foundry Co., Chattanooga, Tenn., to the Converse Bridge & Steel Co., that city.

1060 tons, state highway bridge, Rensselaer, N. Y., to Phoenix Bridge Co., Phoenixville, Pa.

980 tons, state highway bridge, Franklin county, Kentucky, to Wisconsin Bridge & Iron Works, Milwaukee.

900 tons, PWA public school projects, Toledo, O., to local fabricators, including Art Iron & Wire Works, Toledo.

825 tons, repairs to ore and coke structure, Carnegie-Illinois Steel Corp., South Chicago, Ill., to American Bridge Co., Pittsburgh.

750 tons, St. Louis-Jefferson county, Missouri, highway bridge over Meramac river, to Stupp Bros. Bridge & Iron Co., St. Louis.

715 tons, deck plate girder spans, Maryland, for Norfolk & Western, to the Virginia Bridge & Iron Works, Roanoke, Va.

700 tons, plant addition, Ludlow Mfg. Co., Edgemoor, Del., to Robinson Iron & Steel Co., Philadelphia.

695 tons, including 375 tons of sheet steel piling, upper river powerhouse, Spokane, Wash., to unnamed interest. General contractor, Puget Sound Construction Co., Seattle.

675 tons, bridge, Wagoner, Okla., to Virginia Bridge & Iron Co., Roanoke, Va.

600 tons, store building, Fort Worth, Tex., to Virginia Bridge & Iron Works, Roanoke, Va.

591 tons, specification 630, Seminoe dam, Casper-Alcova project, Casper, Wyo., to unnamed interest.

550 tons, service building, University of Cincinnati, Cincinnati, to Ingalls Iron Works Co., Birmingham, Ala.

500 tons, bridge, Webster county, Nebraska, to Omaha Steel Works, Omaha, Nebr.

425 tons, bridge, Grand Island, Nebr., to McClintic-Marshall Corp., Bethlehem, Pa.

410 tons, New York state highway bridge, WPGH RC-3689, Ulster county, to American Bridge Co., Pittsburgh.

405 tons, bridge, No. 12222, Hendricks county, Indiana, to Central States Bridge & Structural Co., Indianapolis.

390 tons, state highway bridge, Esopus, N. Y., to American Bridge Co., Pittsburgh.

360 tons, barge, for Hawaiian Pineapple Co., Honolulu, to unnamed interests.

345 tons, Louisville & Nashville railroad bridge over Cove creek, Careyville, Tenn., to Virginia Bridge & Iron Works, Roanoke, Va.

340 tons, miscellaneous bridge work, Dallas county, Iowa, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

320 tons, bridge, Jacksboro, Tenn., for Louisville & Nashville railroad, to Virginia Bridge & Iron Co., Roanoke, Va.

305 tons, bridge, WPGH 61, Sharkey county, Mississippi, to Virginia Bridge & Iron Works, Roanoke, Va.

260 tons, distillery buildings, Lawrenceburg, Ind., to Ingalls Iron Works Co., Birmingham, Ala.

250 tons, state highway bridge, North Leeds, Me., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

245 tons, state highway bridge, WPH-BP-35-2, Nassau county, New York, to Phoenix Bridge Works, Phoenixville, Pa.

225 tons, bridge repairs, mud river, Milton, Va., to Lackawanna Steel Construction Corp., Buffalo.

220 tons, bridge WPH 190E, Tunica-De Sota county, Mississippi, to Vincennes Bridge Co., Vincennes, Ind.

205 tons, bridge, 79TR-58 PWA 76, Pike county, Missouri, to Stupp Bros. Bridge & Iron Co., St. Louis.

200 tons, state highway bridge, Petersburg, N. Dak., to Illinois Steel Bridge Co., Jacksonville, Ill.

196 tons, specification 649, Seminoe dam, Casper-Alcova project, Casper, Wyo., to unnamed interest.

195 tons, bridge WPGH 107H, Noxubee county, Mississippi, to Austin Bros., Dallas, Tex.

180 tons, state highway bridge, Dorset, Vt., to Boston Bridge Works, Cambridge, Mass.

175 tons, senior high school, Hudson, N. Y., to Belmont Iron Works, Eddystone, Pa.

175 tons, addition to Rock Hill Printing Co., Baltimore, to Southern Engineering Co., Charlotte, N. C.

175 tons, bridge, WPGH 1139C and D, Bolivar county, Mississippi, to Vincennes Bridge Co., Vincennes, Ind.

150 tons, multiple span bridge, Hitchcock county, Nebraska, to Omaha Steel Works, Omaha, Nebr.

150 tons, bridge WPH 220, Hancock county, Mississippi, to Jones & Laughlin Steel Corp., Pittsburgh.

145 tons, bridge, Wells, Me., to American Bridge Co., Pittsburgh.

138 tons, state crosing, near Beaumont, Riverside county, California, to unnamed interests.

129 tons, bridge near Dudley, Kittitas county, Washington, to unnamed interest.

125 tons, bridge, WPGH 221C, Tallahatchie county, Mississippi, to Jones & Laughlin Steel Corp., Pittsburgh.

110 tons, bridge WPH 274-B, Chicasaw county, Mississippi, to Jones & Laughlin Steel Corp., Pittsburgh.

Shape Awards Compared

	Tons
Week ended Dec. 21	25,584
Week ended Dec. 14	26,936
Week ended Dec. 7	23,335
This week, 1934	13,498
Weekly average, 1934	16,284
Weekly average, 1935	16,923
Weekly average, November	18,746
Total to date, 1934	855,223
Total to date, 1935	880,024

Shape Contracts Pending

4000 tons, assembly plant, Los Angeles, for Chevrolet Motor Co., Detroit.

2000 tons for municipal auditorium, Kansas City, Mo., W. S. Bellows Construction Co., Tulsa, Okla., general contractors.

1700 tons, Alcova dam, near Casper, Wyo.; S. J. Groves & Sons, low. W. E. Callahan, Gunther & Shirley, Los Angeles, general contractor.

1300 tons, livestock building, San Francisco; bids rejected.

1000 tons, bridge, Tacoma, Wash.

975 tons, bridge, Frankfort, Ky.

520 tons, two buildings, for Pilgrim state hospital, Brentwood, Long Island, N. Y.

510 tons, six state highway bridges, various locations, Montana.

500 tons, piling, dock, Standard Oil Co. of Indiana, East Chicago, Ind.; Fitzsimmons & Connell Dredge & Dock Co., Chicago, general contractor.

490 tons, state lift span over Old Men's creek, N. J.; Vare Construction Co. low on general contract; 100 bars also required.

425 tons, state under-crossing, Charter Way, Stockton, Calif.; general contract to Biasotti, Willard & Biasotti, Stockton. Rocca & Co., San Rafael, Calif.

420 tons, high school, Watervliet, N. Y.

410 tons, sheet piling and shapes, dam and powerhouse at Spokane, Wash.; Puget Construction Co., Seattle, general contractor.

362 tons, state undercrossing, Hobart street, Los Angeles; John Strona, Chino, Calif., low on general contract.

360 tons, piling, seawall, Sausalito, Calif.; Lindgren & Swinerton, San Francisco, low on general contract.

338 tons, state undercrossing, Main street, Salinas, Calif.; F. O. Bohnett, Campbell, Calif., low on general contract.

334 tons, state undercrossing, Soledad, Calif.; Paul J. Tyler, Oroville, Lord & Bishop, Sacramento, Calif., low on general contract.

288 tons, state undercrossing, Famosa, Kern county, Calif.; Griffith Co., Los Angeles, low on general contract.

260 tons, including 71 tons of reinforcing, Second avenue west bridge, Seattle; General Construction Co., Seattle, general contractor.

235 tons, state undercrossing, Lafayette street, Santa Clara, Calif.; general contract to Barrett & Hilp, San Francisco.

235 tons, undercrossing, Army street, San Francisco; general contract to M. B. McGowan Inc., San Francisco.

200 tons, building, Timken Roller Bearing Co., Canton, O.; bids in.

190 tons, state undercrossing, Washington avenue, San Leandro, Calif.; general contract to Bodenhamer Construction Co., Oakland, Calif.

185 tons, piling, flood wall, Allentown, Pa.; M. A. Long, Allentown, low.

171 tons, state bridge, Stanislaus county, California; general contract to Pacific Bridge Co., San Francisco.

160 tons, gymnasium, Williamsport, Pa.; Berwick Lumber & Supply Co., Berwick, Pa., low on general contract.

160 tons, state undercrossing, Red Bluff, Calif.; F. C. Amorosa, San Francisco, low on general contract.

160 tons, Iron Mountain pumping plant, metropolitan water district, Los Angeles; bids Jan. 14.

135 tons, gymnasium, high school at Collindale, Pa.; Joseph R. Farell, Collindale, low.

100 tons, plant building, Chicago, Glidden Co., Cleveland.

Unstated tonnage, plant buildings, Chicago, Sherwin-Williams Co., Cleveland.

Unstated tonnage, plant addition, Hammond, Ind., Lever Bros. Co., Cambridge, Mass.; Stone & Webster Engineering Corp., Boston, engineer.

Unstated tonnage, Wieboldt department store, Oak Park, Ill.

Unstated, chemistry building, University of Washington, Seattle; bids soon.

Reinforcing

Reinforcing Bar Prices, Page 57

New York—Sellers report a substantial volume of public work pending. On certain highly desirable PWA projects, where details of the plans still are to be worked out, it is indicated that the Dec. 15 deadline for bids will be extended.

Pittsburgh — The market is fairly active. A project at Louisville, Ky., involves 600 tons for the J. E. Seagram Sons distillery, on which a rail steel bid has been received at $6 a ton under the market. The new billet steel bar market is fairly firm at 2.05c, Pittsburgh, and rail steel bars are quoted unchanged at 1.90c, Pittsburgh.

Cleveland—Fabricators are figuring on 4300 tons of bars and 900 tons of structurals in the Kentucky state, Louisville & Nashville railroad grade elimination project in Louisville. Six hundred tons of bars are required for two sewage disposal projects at Massillon and Mansfield, O. The market in Cleveland is quiet.

Chicago — Reinforcing bars continue active, distributors still being rushed in the placing of bids on the large number of public works projects outstanding. Orders are fewer than inquiries, though additional awards are to be made shortly in connection with federally financed work. Several large industrial plants, including buildings for the Sherwin-Williams Co. and Lever Bros. Co. will be up for bids shortly. For a state hospital at Dunning, Ill., 325 tons of bars have been placed.

Boston — Inquiries so far this month are more numerous but actual buying still is light. Sellers look for much of the pending work to develop into orders after the first of the year.

Philadelphia—Award of 1200 tons for foundations for a high school at Scranton, Pa., features the market. Otherwise, the market is quiet.

San Francisco—Featuring the market in the week was the award of 15,000 tons for the United States engineer's office, Los Angeles, to Los Angeles Iron & Steel Co., distributors. The material has not yet been sublet to producing mills. So far this year 220,356 tons have been placed, compared with 115,938 tons in the same period last year. J. F. Shea Co. Inc., Los Angeles, is low bidder on the general contract for precast reinforced concrete pipe for the metropolitan water district, Los Angeles, requiring 7850 tons. An award is momentarily expected on 14,050 tons for precast pipe for the same district.

Seattle—Demand continues strong, and many projects calling for reinforcing materials are under consideration. Numerous school bids have been opened, estimating forces working overtime.

Concrete Awards Compared

	Tons
Week ended Dec. 21	**19,803**
Week ended Dec. 14	**3,265**
Week ended Dec. 7	**6,095**
This week, 1934	**1,618**
Weekly average, 1934	**4,084**
Weekly average, 1935	**6,918**
Weekly average, November	**7,369**
Total to date, 1934	**213,831**
Total to date, 1935	**359,743**

Reinforcing Steel Awards

15,000 tons, proposal 509-36-233, United States engineer's office, Los Angeles, to Los Angeles Iron & Steel Co., Los Angeles.

1275 tons, specification 630 Seminoe dam, Casper-Alcova project, Casper, Wyo., to unnamed interest.

1200 tons, foundation, high school, Scranton, Pa., to Kalman Steel Corp., Bethlehem, Pa.

690 tons, state viaduct, City street, Seattle, Wash., to unnamed interest.

400 tons plant addition, Ludlow Mfg. Co., Edgemoor, Del., to Taylor Davis Inc., Philadelphia.

377 tons, state highway work, California, to unnamed interests.

325 tons, state hospital, Dunning, Ill., to Inland Steel Co., Chicago.

225 tons, Thirty-fourth street crossing, Tacoma, Wash., to Pacific Coast Steel Corp., Seattle; McCrae Bros., Seattle, general contractors.

202 tons, storm drain, Anaheim, Calif., to unnamed interest.

109 tons, state bridge, Grand county, Utah, to unnamed interest.

Reinforcing Steel Pending

27,000 to 35,000 tons, 9-foot 8-inch to 12-foot diameter, precast or welded steel pipe, specification 137, metropolitan water district, Los Angeles; bids Jan. 7.

9128 tons, placing, desilting works, All-American canal system, Yuma, Ariz.; general contract to Morrison-Knudsen Co. Inc., Utah Construction Co., and Winston Bros., San Francisco.

7850 tons, schedules 6-P and 7-P, specification 134, precast pipe for metropolitan water district, Los Angeles; J. F. Shea Co. Inc., Mecca, Calif., low on general contract.

4300 tons, also 900 tons of structurals, Louisville & Nashville railroad grade elimination, Louisville, Ky.

1417 tons, Livestock building, San Francisco; bids rejected.

1011 tons, place, specification 136, metropolitan water district, Los Angeles; bids Jan. 14.

815 tons, Bull Lake dam, Riverton, Wyo.; S. J. Grove & Son, Minneapolis, low on general contract at $653,397.50.

600 tons, Spokane, dam and powerhouse; Puget Construction Co., Seattle, general contractor.

390 tons, overhead crossing, Calwa, Calif.; R. R. Bishop, Long Beach, Calif., low on general contract.

369 tons, Schmitz park bridge, Seattle; Martin Schuehle, Seattle, general contractor.

345 tons, sewage disposal plant, Mansfield, O.; bids in.

255 tons, sewage disposal plant, Massillon, O.; bids in.

242 tons, Agassiz school, San Francisco; bids rejected.

238 tons, overhead crossing, Wilmington, Calif.; Sharp & Fellows Contracting Co., Los Angeles, low on general contract.

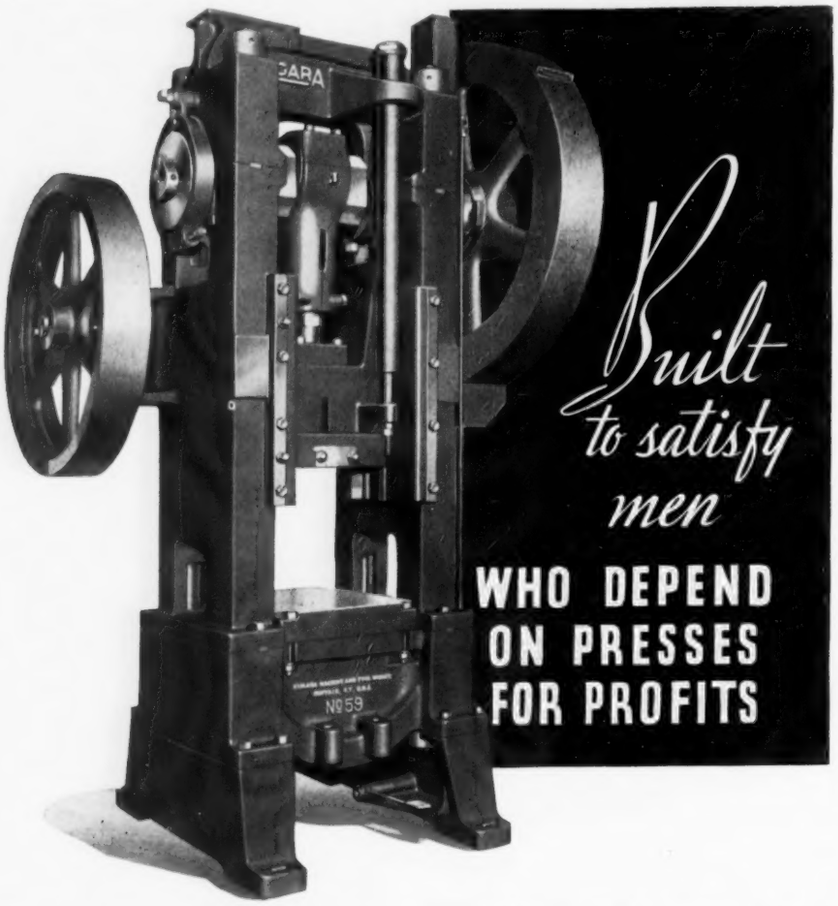
116 tons, crossing, Palo Alto, Calif.; Eaton & Smith, San Francisco, low on general contract.

115 tons, McGraw Street bridge, Seattle; A. W. Quist, Seattle, general contractor.

100 tons, state over-head crossing near Indio, Calif.; general contract to Byerts & Dunn, Los Angeles.

Unstated, two sections Green river gravity system pipe, Tacoma, Wash.; American Concrete & Steel Pipe Co., Seattle, general contractor.

Unstated, two state bridges, Deschutes river, Oreg.; Philpott Bros., Portland, Oreg., general contractor.



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Pig Iron

Pig Iron Prices, Page 58

Pittsburgh—When first announced Nov. 1, the $1 a ton increase in pig iron was to take effect on shipments on and after Jan. 1, but it now seems the intent of producers to accept specifications at the old market as late as Dec. 31 and ship through January and possibly later without applying the advance. Although the foundry melt has been picking up, the more consequential buying is in requirements of several nonintegrated steelmakers.

Cleveland—Pig iron shipments continue to increase, producers making efforts to complete fourth quarter contracts before Dec. 31. From present indications there will be little slowing in the rate of shipments this week. Consumption, as indicated by shipments of foundry coke, is holding up unusually well for this time of the year. Contracting for first quarter so far is relatively light.

Chicago—December will be the most active month of the year in shipments, a gain of around 50 per cent being indicated over November. While new business is limited principally to small lots, a number of consumers, who failed to anticipate their requirements, have found it necessary to re-enter the market. Producers will complete shipments of most speculative tonnage by Dec. 31, though it may be necessary to defer delivery of some tonnage until January.

Boston—Sellers believe some consumers will not be able to specify fully against fourth quarter contracts. In such cases, tonnages will either be cancelled or carried over into next year at higher prices.

Philadelphia—Pig iron is moving well, with the melt exceeding expectations. Some leading sellers do not look for much tonnage to remain unspecified by Dec. 31, although the effect of present heavy shipments probably will be reflected for several weeks after the turn of the year.

Troy Furnace Corp., Troy, N. Y., has relighted its blast furnace.

Buffalo—The usual pre-holiday quiet prevails, although the first quarter outlook is bright. Deliveries on current contracts are being completed on schedule, and belief is held that consumers' stocks are not large in spite of the opportunity to save money by taking deliveries this quarter.

Cincinnati—Shipments are heavier but some who bought before Nov. 1 are slow in releasing tonnages and may seek extension of the deadline. Other melters underestimated November and December needs, and part of the iron intended for first

quarter stock has been melted, indicating a fairly active market in January and February.

St. Louis—Shipments continue at a rate which will insure December being the peak month this year and, incidentally, the heaviest December since 1929. Despite this heavy movement, year-end inventories will be considerably under expectations, due to continuance of the sizable melt much later into the year than had been anticipated. New buying is fair, and first quarter contracting, while not in great volume, is measurably larger than looked for.

Birmingham, Ala.—Sales have tapered a little, but this is considered temporary. Considerable tonnage is still to be delivered against orders on books.

Toronto, Ont.—While new business in pig iron is beginning to feel the effect of the holiday season, sales are holding at a fairly high level, with awards for the week estimated at around 700 tons. The daily melt also is sustained about 50 per cent capacity. Sales now are mostly in 50 to 100 ton lots, but a few inquiries have been received for delivery early next year but no forward booking has been done.

Scrap

Scrap Prices, Page 59

Pittsburgh — Owing to year end influences, no fresh consumer buying of scrap is being done. A firm undertone persists and the lowest offers by brokers have been $14.25 on No. 1 steel. In spite of the apparent difficulty with which brokers are covering short orders, none are falling behind on deliveries. A large volume of scrap continues to move by water into the Pittsburgh and Wheeling districts from the South. The present range on machine shop turnings remains $9.75 to $10.25 and is drawing comment in view of its wide disparity of $4 to $4.50 a ton under No. 1 steel.

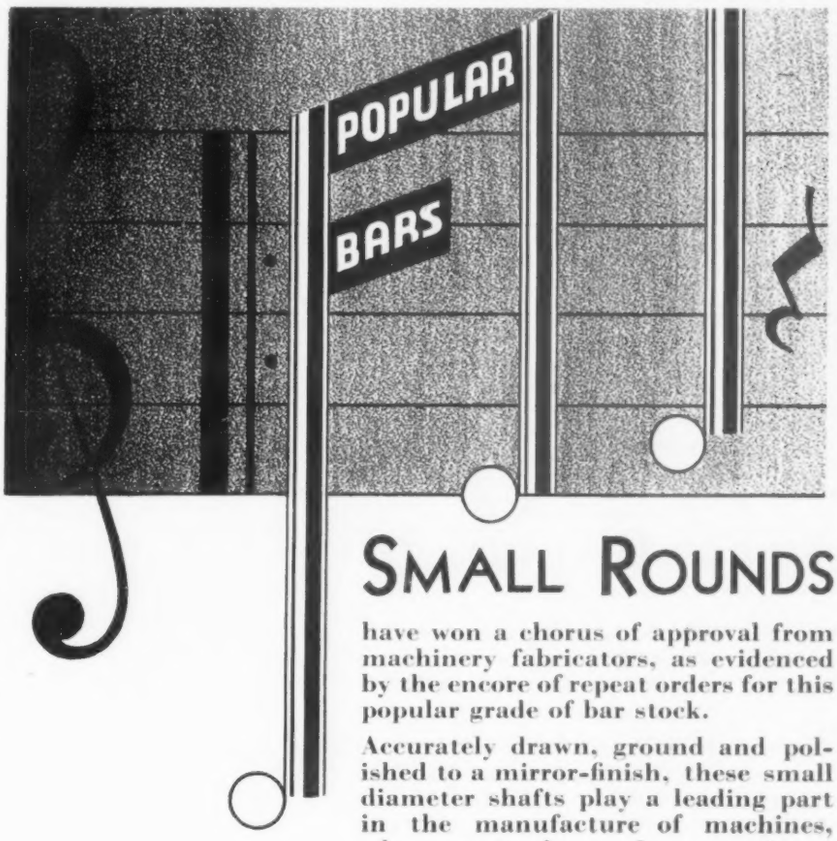
Cleveland—Although melters are not buying scrap at the year end shipments on contracts are going forward as fast as dealers are able to obtain material. The situation is strong, with holders unwilling to sell at the present level and brokers find difficulty in filling contracts. The expectation is that buying in January will bring higher prices.

Chicago — Heavy melting steel has dropped 25 cents on a sale of a moderate tonnage at $13.50. This corresponds with the price paid on the last previous mill sale, though in the meantime the market had risen under the stimulus of bidding by brokers and dealers. Dealers still are unable to obtain this grade at less than $13.25. A quieter market is in prospect for the next few weeks.

Woodmere Scrap Iron & Metal Co., Detroit, on a bid of $16,250, Dec. 16, was awarded four Lake Michigan passenger steamers, CITY OF BENTON HARBOR, CITY OF HOLLAND, CITY OF ST. JOSEPH, and the CITY OF NAUGATUCK, to be broken up for scrap.

Boston — While dealers' buying prices are unchanged the undertone of the scrap market here remains strong. Continued good demand is noted from abroad and this, with the strong situation at Pittsburgh, has imparted considerable strength to the New England market.

New York — Prices on several grades of scrap have been advanced, dealers now offering $8.50 to $9 for No. 1 heavy melting steel and $7.50 to $8 for No. 2 automobile scrap. The promising outlook for scrap consumption in this country, and exceptionally strong foreign demand, account for the continued upward trend. Sellers are hesitant about committing themselves for any extended period because of the strong upward trend in prices. There is also some scurrying



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among dealers to get covered against standing contracts with England.

Philadelphia—Trading in steel and iron scrap is quiet with some adjustments in price, mostly upward. Sellers look for an active market after the first of the year. Open-hearth grades are unchanged and price changes are mostly in minor grades.

Buffalo—A principal melter here now bids $12 for No. 1 heavy melting steel without getting more than small lots at this price, it is claimed. Dealers have first quarter visions of $13 and will not sell for the present at the lower offer. Deliveries on No. 2 steel orders taken at $10.75 are nearing completion. Little scrap is moving this way because of better offers elsewhere. Cast has been selling in small lots at slight advances over recent contracts.

Detroit — Though the market was quieter last week, advances of 25 cents per ton were made in cast iron borings and mixed borings and 50 cents in short turnings and new No. 1 busheling. Several motor plants are closing contracts covering anticipated scrap production for 1936. Fisher Body Co. recently closed in this manner on about 30,000 tons for 1936 at its Cleveland division.

Cincinnati—The iron and steel scrap market exhibits a year-end dullness in absence of tonnage buying by mills, although underlying strength is apparent. The Louisville & Nashville has gradually sold an accumulation and may hereafter issue a list monthly. Bids were taken last week on 3800 tons.

St. Louis—The market for iron and steel scrap is marking time, and little buying is looked for before the end of January or early February.

The edge is definitely off of the advance, due to cessation of new buying and the easier tone at Chicago and some other consuming points.

Birmingham, Ala.—Only a small quantity of scrap will be moving the coming week; dealers are receiving inquiries for a little later on. Stocks on hand are fairly good. Quotations are firm and unchanged.

Seattle—While the market continues quiet, prices are being maintained, supported largely by domestic buying. While Japan is overstocked, accumulations are expected to be worked off within 60 days and there is reason to expect renewed buying late in January.

Toronto, Ont.—Demand for iron and steel scrap is holding and some good shipments have been made recently. During the week the last water cargo of the season was loaded at Toronto for delivery to Cleveland. It also is stated that there still is a substantial tonnage of automobile scrap ready for shipment to the United States. Mills in the Hamilton district are taking regular deliveries of heavy melting steel and other lines of steel scrap and Montreal dealers report steady demand for steel grades. Dealers are carrying good stocks and new purchases are for direct delivery to consumers. Prices are unchanged.

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Frank J. Crohan, President

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 57

First quarter contracts for bolts, nuts and rivets are being distributed among buyers, with new discounts applying. Since these prices represent an advance over previous levels, some jobbers and consumers have increased specifications against contracts to anticipate needs. Track bolts have been particularly active in shipments as a result of the recent price increase.

Bolt, nut and rivet consumption among most users in the Chicago district is holding well, particularly in the farm implement and automotive industries. Rivets are unchanged for first quarter at 2.90c. Chicago and

Pittsburgh, and 3.00c, Chicago, for structural sizes and 70 and 5 off list for small rivets.

At Cleveland, specifications for bolts and nuts have held to a high average for four weks. No recession is yet apparent in automotive requirements. Contracts for first quarter are being signed at the higher price levels, but slowly.

Warehouse

Warehouse Prices, Page 60

New York—Demand has held up well so far this month, but the expectation is that it will drop sharply over the next month, in view of the inventory season. Except for a likely revision in cold-finished bars, to conform with mill changes effective Jan. 1, no warehouse change is expected.

Boston—While substantially better than a year ago, demand is beginning to show the effects of the seasonal let-down. Jobbers look for little real improvement before Jan. 1.

Philadelphia—Cold finished steel bars will be advanced $3 to $3.76 per ton Jan. 1. Prices generally are strong, except for reinforcing bars.

Cleveland—December tonnage for leading interests is exceeding that of November, and the year's business is about 15 per cent over 1934. Plates, sheets, and bars are in fairly good demand, but orders for structurals are light.

Detroit—Jobbers advise the trade they will advance cold-drawn bars, $3 a ton, effective Jan. 1, and reduce chemical extras $3 a ton, following recent mill policy. Among other price adjustments soon will be those on bolts and nuts and merchant wire products. Warehouse steel sales hold remarkably well.

Chicago—Sales are slow to recede and volume will compare more favorably than usual with November. Few price changes are in prospect for January.

Cincinnati—Seasonal influences tending to curtail trade are moderate and tonnage is holding close to November levels.

St. Louis—Business is reflecting the usual seasonal influences. Building materials continue to move in relatively large volume.

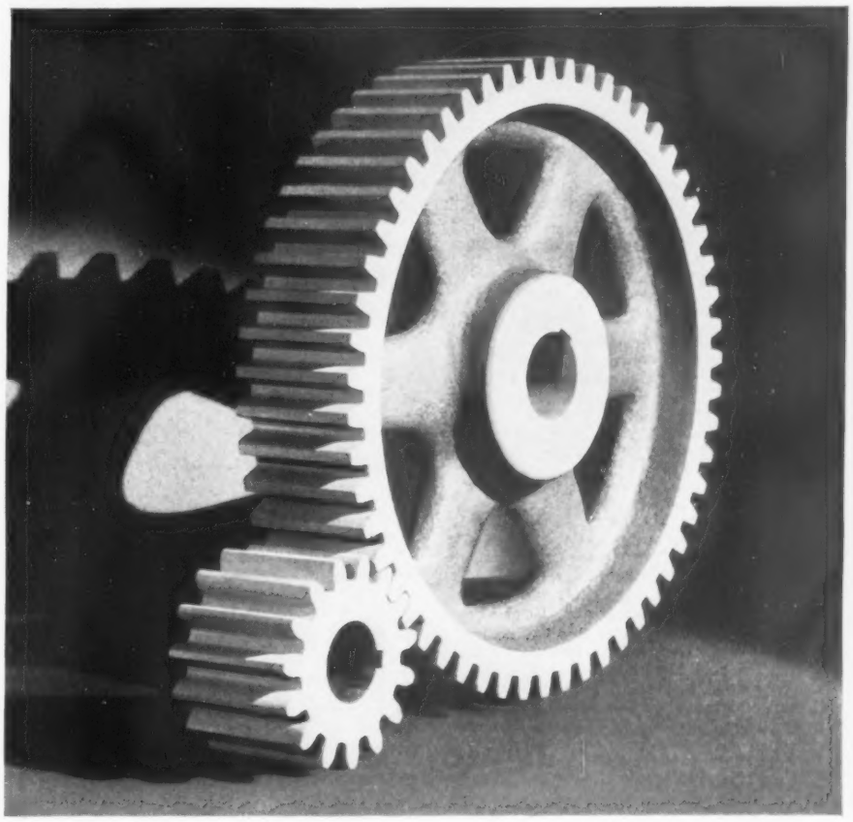
Seattle—Volume is less than a month ago, dealers anticipate a heavy movement next month.

Metallurgical Coke

Coke Prices, Page 57

A number of industrial users of coke and coal in the Pittsburgh district are retrenching on inventories and fresh specifications for furnace and foundry grades of both beehive and by-product coke have been devoid of feature. On beehive furnace coke, while it is true that one important Pittsburgh consumer has negotiated its requirements at $3.50, Connellsville, Pa., oven basis, and another at $3.45, same basis, it is also true that these prices represent an absolute minimum. On small orders producers are able to obtain $3.65 and even $3.75. On ordinary heating coke the market is quoted at $3.40 per ton. For common beehive foundry coke the market holds at $4, ovens, and a range of $5.50 to $5.75 is continued on premium foundry.

Shipments of by-product coke in the Chicago district are almost equal to those of November. Foundries are expected to shut down for a minimum period for the holidays. Prices are unchanged. Birmingham suppliers are increasing production and the price is steady. Holiday shutdown will be short.



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Steel in Europe

Foreign Steel Prices, Page 60

London—(*By Cable*)—Winter is slowing steel demand in Great Britain, but steelworks' order books are well filled and deliveries still are greatly extended. Production costs are rising, owing to higher prices of coke and ore. For this reason producers are not anxious to commit themselves further into the future. All steel departments are active, with galvanized sheets lagging somewhat.

Imports of steel in November at 76,999 tons showed a decline of 24,222 tons from 101,221 tons in October. Exports in November were 215,835 tons, a loss of 8198 tons from the 224,033 tons exported in October. The shorter month accounts for the difference.

Export trade by Continental countries is quiet. Belgian and German domestic trade is better and France is meeting some improvement at home.

Truscon Steel Co., Youngstown, O., is fabricating 3,408,000 square feet of galvanized wire fabric for the New Orleans district. Last week federal engineers were inspecting the material which will be used in flood control work on the lower Mississippi.

Behind the Scenes with STEEL

Holiday Mood

THE Yule logs are burning brightly this 1935 Christmas season. The bowls of Tom and Jerry are ready for the bon vivants. It's snowing. It's cold. Prosperity is practically here (mmm-hmmm!). The good burghers have draped General Electric lamp bulbs over outdoor fir trees. Junior's electric train is ready to be short-circuited and bent out of shape.

Ever in tune with the times, we hereby proffer to all readers our wishes for the merriest of Christmas days and for an eventful and profitable New Year.

And to that gentleman in New York whose eyes get tangled up when he reads STEEL: Merry Christmas!

To J.C.S. in Buffalo who can find a typographical error as quick as anything: Merry Christmas!

To John Long at Bethlehem (not O Little Town of): Merry Christmas!

To Mr. A. Goldberg, Russian rolling machines engineer: Buon natale (that'll hold him)!

To Monsieur Blank with Brasseries-sur-le-Meuse: Joyeux Noel!

To the several department stores which will have one hell of a time collecting this writer's holiday bills: Froeliche Weinachten!

Or as the natives say in the mountainous regions of far-off Samtrab: Sibijnak Whap!

* * *

Any Old Die Blocks?

C A. WAITE of Pittsburgh, a jobber who takes orders for hammered forgings, drop forgings, die blocks, billets, plates and bars, writes that he likes STEEL *because it keeps him "in touch with the changing conditions." He also confesses to being in the market for surplus or obsolete die blocks which are used by drop forging concerns. If any of you folks have a mess of these blocks cluttering up your plant or yard, you had better get in touch with Mr. Waite at 629 Rossmore avenue. The pleasure is all ours.*

* * *

Present

YOUR Christmas gift from STEEL will be a little late, as it is still in the making, but we can tell you it will be a dandy. Don't tell us you have guessed what it is already. That's right, the *Yearbook of Industry* issue, which will be in your hands bright and early Monday morning, Jan. 6, 1936.

We have had a few glimpses at some of the features which are being incorporated in this big issue, and they are, to put it bluntly, the nuts.

It will be the largest issue of STEEL in some five years and there have been some ugly rumors floating around to the effect that it will have to be shipped to readers by express due to its heft. These are not true. Your postman will stagger in with it, and our only caution is for you to avoid dropping the volume on your pet corn.

* * *

Booster

JOHN L. MOHUN, self-styled "free lance" mechanical engineer in Chicago, tells us: "I obtain considerable information from STEEL. It is a fine publication." Just as if we didn't know it!

* * *

Precious

A CUSTOMER of the Wickwire Spencer Steel Co., with a mathematical turn of mind, figures that he is paying that company approximately $20,000 per ton for wire of a rare alloy, drawn to a gage considerably finer than the human hair. When fabricated into minute springs by this customer, the value of the material jumps to $1,694,000 per ton.

If you are interested in ordering a few tons of these springs, just to try them out, we will be glad to forward your request to the manufacturer. Of course the price would be a little higher with 3% sales tax added—$1,744,820, to be exact.

* * *

Fake

ONE of our roving editors was strolling up West 39th Street in New York the other day and his eagle eye was attracted to a resplendent emporium over which blazoned the sign "Enduro Sandwich Shop." Here, he thought, was another architectural application of Republic's famous Enduro stainless steel. As he drew closer he investigated the storefront carefully and found, to his surprise, that it wasn't steel at all. Just wood, painted over with aluminum.

He didn't eat there. Went on over to the Automat.

—SHRDLU

Iron Ore

Iron Ore Prices, Page 59

Cleveland—Lake Superior iron ore consumption in November reduced stocks at lower lake ports and furnaces Dec 1 to 35,840,681 tons, or 1,563,713 tons less than on the comparable day last year. The Lake Superior Iron Ore association reports the following figures on consumption and stocks.

	Tons
Consumed in October	2,910,863
Consumed in November	3,020,315
Increase in November	109,452
Consumed in November, 1934	1,298,404
On hand at furnaces Dec. 1, 1935	28,963,703
On Lake Erie docks Dec. 1, 1935	5,313,265
Total at furnaces and Lake Erie docks Dec. 1, 1935	34,276,968
Total Dec. 1, 1934	35,840,681

Ferroalloys

Ferroalloy Prices, Page 58

New York—With the reduction of $10 a ton on ferromanganese not effective until Jan. 1, releases continue restricted to barest necessities. However, there is contracting for the first quarter, and also for domestic spiegeleisen on which prices have been reaffirmed for next quarter at $26, Palmerton, Pa., for quantities up to 50 tons, and $24 on lots of 50 tons and over, 19 to 21 per cent material.

Nonferrous Metals

Nonferrous Metal Prices, Page 58

New York—Domestic nonferrous metals resisted retarding and depressive influences last week with all major metal prices with the exception of tin, holding steady.

Copper—Sales continued to hold at a remarkably steady pace with the December total through Thursday of 33,547 tons exceeding the November volume. Talk of an advance in price was all but completely smothered by the adverse influences arising from the silver debacle. All primary producers quoted 9.25c, Connecticut, for electrolytic.

Lead—Sales declined slightly from the previous week's active rate but the market tone held firm on the basis of 4.35c, East St. Louis. Further strengthening of the statistical position was revealed in the

November statistics showing a cut of over 3000 tons in total domestic refined stocks.

Zinc—The fall in London prices to threaten parity and lower with the domestic East St. Louis market did not cause any weakness in the price structure here. All producers continued to quote on the basis of 4.85c, East St. Louis.

Tin—Prices dropped to 49.00c for Straits spot with buying interest dull. Weakness here was due to easiness in London.

Antimony—Prices eased Friday to 14.50c and 11.50c, respectively, for Chinese and American spot. Buying was seasonally slow and confined to small lots.

Silver—American treasury did not support the London market last week and prices fell sharply to 51.75c compared with 59.75c Monday.

Quicksilver

New York—Quicksilver prices are unchanged in a quiet market. Sellers' quotations range from $75 to $77 a virgin flask, depending on quantity. Small lots of 15 to 25 flasks are quotably $75.50.

Operates 2 Galvanizing Pots

Niles Rolling Mill Co., Niles, O., now has two galvanizing pots in operation giving it a monthly capacity of approximately 3200 tons. Galvanizing equipment in the plant, which the Niles company took over, was rehabilitated and modernized. New drives were purchased from the Wean Engineering Co. Inc., Warren, O., and new electrical equipment from the General Electric Co., Schenectady, N. Y.

Armco Switches Program

Effective Jan. 1 the American Rolling Mill Co. weekly broadcast, on which Bennett Chapple, vice president, is featured as "The Ironmaster," will move to the National Broadcasting Co.'s blue network on Wednesdays at 8:30 p.m. eastern standard time.

Republic Electrifying Mill

Republic Steel Corp. has started electrification of a blooming mill at its South Chicago, Ill., plant. A 4000-horsepower, reversing - motor drive will replace a steam drive now used on this mill. The change will result in an increase in capacity for the mill and will necessitate only a brief shutdown for the changeover. A new building is being erected to house the electrical equipment. Work is expected to be completed in about three months.

Pollock Cartoons Message Of Steel Plate Service

William B. Pollock Co., Youngstown, O., fabricator of steel plate work from light gages to heavy plates, is putting over its message of service and wide diversity by means of a monthly leaflet. Each presents a cartoon on a subject appropriate to the season or to recent events, and also a picture of a notable achievement of the company in its fabricating field.

RAISE MOLDERS WAGES 5%

Twelve stove foundries in Belleville, Ill., will advance wages 5 per cent Jan. 1 following negotiations with the molders' union. In July, 1934, a 10 per cent increase was granted.

Each had a Separate Casting Problem...

but PERMITE solved it!

GREATER strength with less weight was sought for one of these parts. Another demanded greater resistance to corrosion. Lower machining costs were a crucial need for a third. Better appearance as well as lighter weight was required for some of these other products. For each, Permite Aluminum Alloy Castings brought the answer.

These high grade castings are produced by a pioneer in the aluminum field. Expert selection of the proper aluminum alloys; close metallurgical supervision thru X-ray examination and laboratory tests; accurate and uniform manufacture by Permite's individual mold and heat-treating processes; all have an important part in building permanent quality into Permite Castings.

Learn how Permite may help you to improve quality and to lower costs. Send blueprints for confidential recommendations and quotations.

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Financial

VALLEY MOULD & IRON CORP., with plants in Hubbard, O., Sharpsville, Pa., and Chicago, will propose a recapitalization program at a special stockholders' meeting Jan. 30 to eliminate the bonded debt and the $35 accumulation on the 7 per cent preferred stock. It is proposed to issue a prior preference $5.50 stock, giving preferred stockholders the equivalent of $5 in cash and 1.3 shares of the new stock to replace the present preferred and the arrearage. A dividend of $3.85 per share will be paid March 1, after which the stock will draw dividends of $5.50. Net profits in the first ten months of 1935 were $246,000, according to W. H. Ramage, president.

B & L MARKETS SHARES

Bliss & Laughlin Inc., Harvey, Ill., manufacturer of cold-rolled steel and shaftings, has marketed 50,000 shares, par value $5, at $16.50.

CHEERING DIVIDEND NEWS

Arthur G. McKee & Co., Cleveland, extra of 25 cents, in addition to regular of 25 cents, Jan. 2 to record of Dec. 20; Stanley Works, New Britain, Conn., extra of 25 cents and regular of that amount, Dec. 30; Link-Belt Co., Chicago, quarterly dividend increased from 20 cents to 30, payable March 2 to record of Feb. 15; Vichek Tool Co., Cleveland, resumes by declaring 10 cents Dec. 31 to record of Dec. 26; Art Metal Construction Co., Jamestown, N. Y., resumes, with 15 cents on the common, Jan. 2 to record of Dec. 23; Bird Machine Co., South Walpole, Mass., resumes with 25 cents Jan. 2 to record of Dec. 20; Steel Co. of Canada Ltd., Hamilton, Ont., extra of $1.42½ on common, and regular of 43¾c on both common and preferred, Feb. 1 to record of Jan. 7.

TRACTOR PROFITS INCREASE

Caterpillar Tractor Co., Peoria, Ill., reports net profit in the first 11 months of $5,186,488, compared with $3,459,065 a year ago.

MYERS' PROFIT RISES

F. E. Myers & Bro. Co., Ashland, O., reports net profit of $659,860 for the year ended Oct. 31, compared with $567,744 in the preceding year.

ALUMINUM CUTS ARREARAGE

Aluminum Co. of America, Pittsburgh, has declared a dividend of 37½ cents on the preferred stock and a 50-cent dividend on account of accumulations also on the preferred, both of which are payable Jan. 1 to Dec. 14 record. In previous quarters this year 25 cents has been paid on accumulations.

Transportation

AN INCREASE of 15 per cent in carloadings in January over the average of the season now closing, which would bring the total to about 800,000, would result in a car shortage, according to Harry A. Wheeler, president, Railway Business association, Chicago. More than 15 per cent of freight cars owned is in need of repairs, mostly of a major character.

FORECAST 18% GAIN IN STEEL LOADINGS AT PITTSBURGH

Increase of 2.3 per cent over this year in carloadings in the Allegheny district, comprising the tri-state area around Pittsburgh, is forecast for the first quarter in 1936. A total of 765,006 cars for the coming three months is anticipated, against actual loadings of 748,139 cars in the first quarter of this year. Considerable optimism for steel loadings is forecast, inasmuch as the estimated 136,636 cars, an increase of 18 per cent over the 1935 period, is greater than in any quarterly forecast in 1935.

Meetings

INSTITUTE OF SCRAP IRON AND STEEL INC., New York, is maturing plans for its convention at the Sherman hotel, Chicago, Jan. 21-23. First day will be devoted to committee and board meetings. On the second day, open forum discussions will be held on scrap costs and competitive conditions which reduce scrap profits. On the third day a review of conditions in the various scrap markets will be conducted by selected speakers from each district.

POWER CONFERENCE IN APRIL

Sixth Midwest Power Engineering conference, 308 West Washington street, Chicago, has scheduled a meeting for April 20-24 inclusive, at Chicago. The conference will be sponsored by the local sections and regional divisions of the American Institute of Electrical Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, Edison Electrical institute, Western Society of Engineers, National Safety council, and American Society of Refrigerating Engineers.

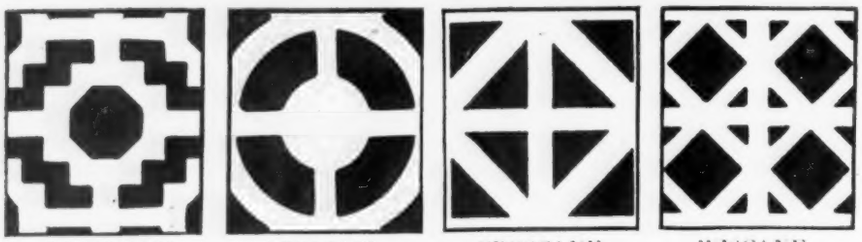
BRITISH ACETYLENE GROUP HOST TO 1936 CONGRESS

The Twelfth International Congress of Acetylene, Oxyacetylene Welding and Allied Industries will be held in London, June 8-13, 1936, under the direction of the British Acetylene association. This congress will mark the fiftieth anniversary of industrial production of oxygen in Great Britain and the centenary of the discovery of acetylene.

The purpose of the congress is the scientific, technical and economic study of questions relating to calcium carbide, acetylene, oxygen, oxyacetylene welding, and to their various applications. Other welding processes are admissible insofar as they have a bearing upon the development of oxyacetylene welding and cutting.

V. A. Amodeo and A. B. Harrower.

WICKWIRE SPENCER perforated metals



LACECANE CIRCANE CROSCANE WISCANE

The Clinton Works of the Wickwire Spencer Steel Company was the first plant in America to produce perforated metal. It has kept apace with each new development in the art of perforating metals and offers today, a service that is unique in its completeness. A few of the newer designs are shown in the new circular "Decorative Perforated Metals." You will find it of value to you.

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39 East 42nd Street New York City

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Send for this *new* Perforated Metals Folder

1 Albermarle street, London, W. 1, are joint general secretaries.

Safety

AMERICAN Rolling Mill Co. at its blooming, box, and strip mill department, at Middletown, O., recently established a record of 753 days, or 936,000 man-hours, without a lost-time accident.

NATIONAL GETS AWARDS

National Screw & Mfg. Co., Cleveland, has received an award for the least time lost following industrial accidents in the Cleveland district.

News Oddities

AN EXPERIMENT in the construction of ship hulls of aluminum alloy is in process, following launching of a 10-foot shell, which is a cross section of a ship, at Bath, Me., last Monday. This shell is to be taken to Newport News Va., and experimented with several years. It is claimed that hulls, the equal of steel in strength, can be built of aluminum alloy that is 40 per cent lighter.

POURS 80-TON CASTING

What is believed to be the largest steel casting ever produced west of Pittsburgh was poured recently at the plant of the Hubbard Steel Foundry division, Continental Roll & Steel Foundry Co., East Chicago, Ind. The casting, weighing 160,000 pounds, is a rolling mill housing and is one of six to be built by this company for an installation in the Chicago district.

EVEN GLASS IS COMPETING

Steel has a new competitor in woven glass. Textiles woven of glass have been made by the Corning Glass Works, Corning, N. Y. Glass fiber forced through minute orifices under great pressure is being spun for many uses, including filters which are resistant to acids and other corrosives, building insulation, awnings, and interior decorations for which stainless steel and other metals have been used.

Continue Bolt Package Code

Division of simplified practice, bureau of standards, Washington, has announced that simplified practice recommendation R60-30, packaging of carriage, machine and lag bolts, has been reaffirmed, without change, by the standards committee of that industry.

This recommendation, which establishes a simplified schedule of package sizes for cut or roll thread carriage, machine and lag bolts, was originally promulgated in 1927. The revision became effective March 15, 1930, subject to regular review by the standing committee.

Foreign

TRAVEL round the world with reports to the department of commerce, Washington, from its various foreign offices relating the state of the iron, steel, and equipment markets:

GERMAN DIESELS IN DEMAND

The German diesel engine industry has made notable progress this year, exports in the first half amounting to 2760 units, compared with 2297 a year ago. Exports in the first half year were valued at $3,711,600. Marine diesels led exports. Italy was the outstanding buyer, with the Netherlands, Mexico and Spain following.

SOUTH AFRICA IMPOSES DUTY TO PROTECT STEELWORKS

Union of South Africa has placed an ordinary dumping duty, effective immediately, upon galvanized iron sheets imported from both the United Kingdom and the United States. This duty is equivalent to the difference between the current domestic value in the United Kingdom and the United States and the respective export prices, but not exceeding 50 per cent of the current domestic values. The purpose is to protect the comparatively new South African iron and steel industry. The new state-operated steelworks in South Africa has been working at capacity since it was opened ten months ago.

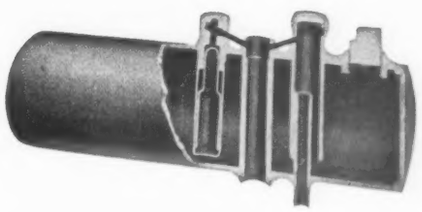
RAND MINES BUY U. S. PLATES

Adjustments in shipping rates to South Africa have brought many American steel products in line with British and continental competition, and the result is a rapidly expanding market in steel plates, plain and barbed wire, black and corrugated galvanized sheets. Gold mines on the Rand like the workability and tensile strength of American plates, and as a result American plate mills compete strictly on a price basis with the British, but can command a slight premium over Belgium or German mills. A building boom involving increased use of black sheets in houses is quickening this market.

EXPORTS MORE METAL FRAMES

British exports of metal window frames have increased remarkably in the past three years. The value

CROSBY STAMPINGS



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of exports in the first eight months of 1935 was $1,150,000, an increase of 104 per cent over the corresponding period of 1934. South Africa took one-third of these exports.

POLES HOPEFUL FOR CARTEL

Polish steel producers expect improvement since their inclusion in the International Steel cartel. Poland's export quota of 350,000 tons is below the average Polish exports for the past six years, but the price is more favorable. Formerly Russia was the chief market for Polish steel, but important gains are claimed in Brazil, Argentina, Holland, Belgium, the Near East, and the Far East.

GREECE FOR U. S. TIN PLATE

Greece, which consumes 3200 to 3500 metric tons of tin plate annually, is showing increased interest in American tin plate. For many years England has been the chief source of supply for Greece, but Germany has recently been figuring in the market, and now American plate is coming in.

CZECHOSLOVAKIA'S IRON, STEEL OUTPUT GAINING HEAVILY

Expansion of Czechoslovakia's iron and steel manufacturing industry was reflected in October pig iron and crude steel production, which represented the highest monthly output in three years. Pig iron production during the month totalled 76,723 metric tons against 73,400 tons in September and 54,500 tons in October, 1934. October output of steel ingots amounted to 110,595 metric tons, compared with 94,300 tons in September and 80,800 tons in October, 1934. Cumulative figures show pig iron production for the first ten months aggregated 651,800 metric tons, an increase of 28.3 per cent. Steel ingot production totalled 972,300 tons in 10 months, an advance of 19 per cent.

BRITISH WILL JOIN CARTEL

The British Iron and Steel federation has just taken steps to set up the machinery necessary to carry out its agreement with the International Steel Cartel. As the terms of its constitution do not permit the federation to enter into contracts and financial commitments on behalf of the industry as a whole, a new company, the British Iron & Steel Corp., has been registered to "carry on the business of dealers in and importers and exporters of iron, steel, metals and minerals; and of manufacturers of and dealers in iron and steel products and alloys."

Renew Web-Joist Standard

Division of simplified practice of the national bureau of standards has announced that simplified practice recommendation R94-30, open-web steel joists, has again been reaffirmed, without change, by the standing committee of the industry.

This recommendation establishes a simplified schedule of sizes for joists ranging from 8 to 16 inches in depth and not longer than 24 times their depth, and specifies properties and allowable loads in pounds per linear foot. Designations, stresses, resisting moments in inch-pounds, and maximum end reaction in pounds are included.

The program was originally effective Oct. 1, 1930, and was reaffirmed without change in 1933.

LOOK FOR FTC STEEL REPORT ABOUT FEB. 1

No angle of the investigation the federal trade commission is making for President Roosevelt into the alleged collusive bidding of four steel companies on government piling contracts has been completed, it is learned at the commission.

The so-called steel committee of the commission, which is at work on the investigation, has been ordered to give priority to this over any other work, and as a result there is a mere guess at the offices of the commission that the report may be ready for the President about Feb. 1. Field work is under way, but aside from this officials refuse to make any statement.

Equipment

Pittsburgh — Jones & Laughlin Steel Corp.'s plans for a continuous strip-sheet mill will comprise two electrically-operated divisions; the first will be a hot-rolling division consisting of a four-high type mill with a full complement of heating furnaces, tables, shears, trimmers, levelers, pilers, coilers, and other necessary equipment for finishing and shipping hot-rolled stock to the trade and to the company's cold-rolling division, tin plate department and pipe mills at Aliquippa, Pa. The second division will comprise a cold-rolling unit, four-high design, set in tandem and singly, and with a full complement of finishing equipment, picklers, heat treating furnaces, shears, trimmers, etc. The entire plant will be housed in a building covering about 20 acres and equipped with a number of modern electric overhead traveling cranes.

Twelve overhead electric cranes, ranging in capacity from 10 to 100 tons, and for installation at the new Homestead plate mill of Carnegie-Illinois Steel Corp., have been awarded to three builders—Alliance Machine Co., Alliance, O., Whiting Corp., Harvey, Ill., and Shaw-Box Crane & Hoist Co. Inc., Muskegon, Mich.

Chicago—Seasonal influences are restricting activity in various equipment markets. Inquiries and pending work still are fairly heavy, but closing on proposed purchases is deferred in a number of cases. Little change has appeared in demand for smaller types of tools and miscellaneous equipment. Republic Steel Corp. has started work on electrification of its blooming mill at South

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Chicago, while Carnegie-Illinois Steel Corp. is repairing its ore and coke handling facilities at the same point. Greater emphasis by steel mills on improvements to iron and steelmaking divisions is looked for next year, though much work remains to be completed in rolling departments.

New York—Substantial buying of heavy equipment is noted here, with two lists involving milling machines, boring mills, lathes, shapers, brakes and shears and at least some grinding equipment. In addition, a Long Island City sheet metal worker has closed on a dozen machine tools, not including welding equipment and certain other auxiliary requirements. Shipyards are figuring more actively, but sellers are not inclined to count too much on extended buying in this field, at least for the time being. Meanwhile, sellers report more extended deliveries. Some producers of heavy equipment appear unable to offer deliveries under three to four months. This situation, it is said, is attributable not only to the good volume of demand throughout the country, but to the scarcity of skilled machinists. While so far as can be learned no definite announcement has yet been made, it is reported that there may be a price advance in brakes and shears shortly, possibly around the first of the year.

Seattle—Business is active in certain lines. Seasonal restrictions are affecting demand for mining and logging machinery and tools, but pumping equipment and other items involved in public works projects are moving in increased volume.

Construction and Enterprise

Ohio

CLEVELAND — Kragley Mfg. Co. has been incorporated by Harold J. Glickman, Leader building.

CLEVELAND — Metal Fittings Inc. has been incorporated by Morgan, Landfear & Basking, 1006 Williams building.

CLEVELAND — Angell Nail & Chaplet Co., 4580 East Seventy-first street, is erecting a 50 x 60 foot addition for a machine shop, and in the spring expects to build a larger addition to its factory, for the housing of further operations.

CLEVELAND — Marquette Metal Products Co., 1145 Galewood avenue, is building a new assembly plant for the manufacture of diesel engines. The building will contain 12,000 square feet of space and will cost $40,000. W. S. Jack is president.

COLUMBUS, O.—C. E. Carr & Co., 163 North Fourth street, C. E. Carr general manager, has purchased a 4-story building at 49-53 East Naghten street. Plans for rehabilitating the building include the conversion of the two upper stories into a modern sheet metal plant for the design and manufacture of sheet metal accessories.

SANDUSKY, O.—Elyria Belting & Machinery Co., Elyria, O., has purchased the site and part of the old Libby Bulb Works and will establish a plant here, for repairing used metal working machinery.

Michigan

DETROIT — Consumers Power Co. plans an expenditure of $2,000,000 in 1936 for the extension of lines, with an ultimate expenditure of $5,000,000 for this purpose.

GRAND RAPIDS, MICH. — W. B. Jarvis Co. will erect a small factory addition, Pierre Lindhout is architect.

GRAND RAPIDS, MICH. — Hartman-Jenkins Inc. has been organized to deal in machinery, by James A. Starr, 824 Michigan Trust building.

JACKSON, MICH. — William Cobb Foundry Co., West Clinton street, has plans for a new foundry building, costing $12,000, excluding equipment. Bids are invited at once.

MARINE CITY, MICH. — Preparations are being made here for the equipment of a portion of the building formerly occupied by the Independent Sugar Co., for a boat manufacturing works. Hans Mauerhoff, naval architect, is in charge, and it is proposed to build cabin cruisers, schooners, auxiliary and all types of small craft, by the electric-welded method.

MUSKEGON, MICH. — Spiral Piston Rings Inc., reorganized a year ago from the former Stanfield Piston Ring Inc., is preparing to start production on a commercial basis. The concern has been engaged in experimental work for the past five years.

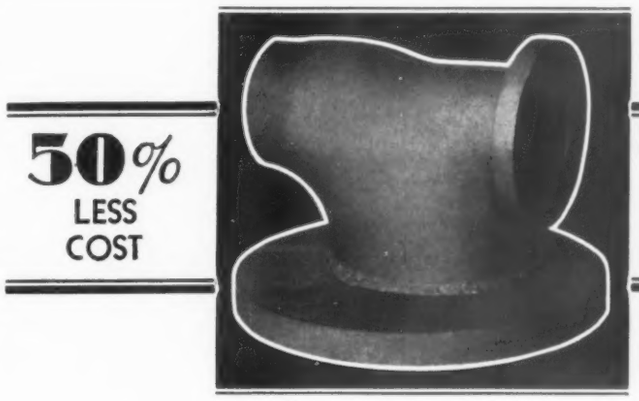
Illinois

CHICAGO — A. J. Gerrard & Co., 105 West Adams street, has been incorporated to deal in machines and accessories, by A. J. Gerrard, V. Frank Banta, and Hayes McKinney, correspondent, 105 West Adams street.

CHICAGO — A-1 Pipe & Coupling Corp., 3650 South Rockwell avenue, has been incorporated by Ruth E. Chernyk, Lucille J. Chernyk, and Harry W. Chernyk, to handle piping, tubing, and couplings of all metals. Correspondent is Rudolph P. Salmon, 30 North LaSalle street.

CHICAGO — Olney J. Dean Steel Co., 228 North LaSalle street, has been incorporated by James R. Martin, John P. Kiley, and A. L. Cronin, to carry on the business of mining, milling, and processing. Correspondent is A. L. Cronin, 127 North LaSalle street.

LAGRANGE, ILL. — Lemont Stamping Corp., 44 Callendar avenue, has been incorporated by Arthur W. Sprague, John H. McBride, and J. Robert Daleigh, to deal in products of all kinds, fabricated from aluminum, iron, steel, copper, and other metals or substances. Correspondent is Tenney, Hard-



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ing, Sherman & Rogers, 120 South La-Salle street, Chicago.

Indiana

INDIANAPOLIS—D-I Specialty Co. Inc., 635 North Noble street, has been incorporated to manufacture machinery and tools by Josephine E. Maxwell, A. J. Hansen, and J. L. Alger. Resident agent is Josephine E. Maxwell, 4322 Winthrop avenue.

MUNCIE, IND.—Gilpen Foundry Co. Inc. has been incorporated to engage in general foundry and machine shop business, by Merelen J. Gilpen, Virginia M. Gilpen, and Harry C. Rowe. Plant is located at 1250 East Gilbert street, and resident agent is Harry C. Rowe, 118 North Meridian street, Winchester, Ind.

New York

GRAND ISLAND, N. Y. — Town will vote Dec. 23 on a proposal to construct a new waterworks on the island.

NEW YORK—W. L. Hauck Inc. has been incorporated by Albany Service Co., 315 Broadway, to manufacture engines, boilers, and pumps.

NEW YORK—Metropolitan Die Sets & Tool Co. Inc. has been incorporated to deal in the manufacture of steel dies. Papers were filed by Davis & Davis, 26 Court street, Brooklyn, N. Y.

NEW YORK — Delaware, Lackawanna & Western railroad, C. C. Hubbell general purchasing agent, 140 Cedar street, will ask for bids Dec. 27 on wrought steel pipe, locomotive boiler tubes, and solid steel wheels.

NEW YORK — Whitney Malleable Range Corp. has been incorporated to deal in furnaces and stoves by Marjorie M. Julig, 104-64 115th street, Queens, N. Y., Louis Katz, 565 West 171st street, and Harold A. Lipton, 444 Central Park west. Papers were filed by Booth, Lipton & Lipton, 11 West Forty-second street.

WEST POINT, N. Y. — Quartermaster, United States military academy, will ask for bids in the spring for the construction of a water supply system addition, including pipe lines. Cost will be $125,000.

Pennsylvania

CONWAY, PA.—Pennsylvania railroad will make extensive alterations to its river-rail terminal here, including construction of a straight-line unloader. An existing whirler crane is to be moved 600-feet upstream.

PHILADELPHIA — Frankford arsenal asks bids Dec. 24 for gray iron castings and bids Dec. 26 for wires, sleeves, and plugs.

PHILADELPHIA — Sun Oil Co. will improve its river landing on the Ohio river near Vanport, Pa., to facilitate unloading gasoline from barges. Improvements will consist of a 6-inch pipeline, a walkway, and three pile clusters.

PITTSBURGH — Construction of a $25,000,000 sheet and strip mill is planned by Jones & Laughlin Steel Corp. The proposed new mill will mark the corporation's entry into the light steel products trade. A number of cranes, in addition to the actual mill installation, will be bought.

PITTSBURGH—Bids will be opened Jan. 11 by federal engineers here, for two vertical triplex single-acting motor driven pumps and equipment. Delivery is to be made within 90 days to Grafton, W. Va., for use at the Tygart river reservoir dam. Pumps are to have a capacity of 120-gallons per minute.

PITTSBURGH — Separate proposals will be received at the office of the county controller of Allegheny county until Dec. 24 for underground steam mains and returns and steel doors for auxiliary building. Further information will be furnished upon application to the contract clerk, room 328, county office building, this city.

Alabama

ALABAMA — WPA will soon begin work on 15 cold storage and warehouse facilities in 15 counties, with cost of each individual warehouse and cold storage plant combination estimated at $20,000, except at Lee and Madison, where cost will be $21,000. Ray Crow is deputy administrator for Alabama WPA.

GALSDEN, ALA.—Dwight Mfg. Co., manufacturer of sheetings, drills, etc., will erect a building, 130 x 140 feet, for slasher division, and will install additional cloth manufacturing machinery.

WARRIOR, ALA.—City, W. R. Gibbs clerk, wants deep well pump, storage tank, filter plant, cast iron pipe, and meters, for $29,000 waterworks.

District of Columbia

WASHINGTON — Navy department, bureau of supplies and accounts, wants bids on the following items Dec. 27: 55 floor polishing and scrubbing machines, electrically operated, with delivery to Mare Island, Calif, schedule No. 6705; 2 pipe threading machines, motor driven, with delivery to Puget Sound, Wash, schedule No. 6714; miscellaneous electric cable with delivery to Mare Island and Puget Sound, schedule 6720; miscellaneous cleavage gages, schedule No. 6722.

Kentucky

LEXINGTON, KY.—John T. Ruddy of Kentucky Independent Packing Co., 1592 Teakwood, Cincinnati, is considering the establishment of an abbatoir in building formerly occupied by the Chesapeake & Ohio railroad, near city limits. Will remodel and renovate and install equipment, with cost of improvements to be $50,000.

LOUISVILLE, KY. — Superior Oil Co. proposes to build a warehouse and increase storage facilities on Fulton street.

MURRAY, KY.—Chamber of Commerce has started construction of a hosiery mill to take care of consolidation of Paducah, Benton, and Murray units of former Paducah Hosiery Mill. Bernard L. Lichten, Philadelphia, is president of new company.

SCOTTSVILLE, KY. — City, R. O. Huntsman mayor, is interested in erecting a hydroelectric power plant on Barren river near Holland, Ky.

Florida

CLEARWATER, FLA.—City, A. C. Nicholas city manager, receives bids Dec. 24 for furnishing materials and constructing boiler house, gas generator house, shop and service buildings.

SARASOTA, FLA. — Florida Dolomite Co., organized by John L. Early, is installing a mining and processing plant on holdings 2½ miles from here. S. D. Gooch, chemical engineer, is president.

Georgia

GEORGIA — Bureau of aeronautics, department of commerce, approved construction of four additional airports in this state: Hawkinsville, $13,001; Madison, constructing runways, etc., $23,228; Thomson, $6668, and Waco, $10,047.

Louisiana

NEW ORLEANS — Johns-Manville Corp., 22 East Fortieth street, New York, S. A. Williams vice president in charge of mines and factories, plants construction of a plant for manufacture of asphalt and asbestos roofing products on its newly-acquired acreage on the west bank of the Mississippi river. Company plans expending $750,000 in 1936 on new plant, which will be managed by R. B. Murphy.

Mississippi

PASCAGOULA, MISS.—Board of supervisors, Jackson county, receives bids here Dec. 28 for constructing sheet pile bulkhead along United States highway No. 90 between Pascagoula and Gautier, Miss., including 20,000 pounds of galvanized iron tie rods. L. C. Winterton is city engineer.

North Carolina

ELIZABETH CITY, N. C. — Perry Laboratories, Alfred S. Perry president, wants prices and data on needle valves, gray iron, and other light or medium castings.

FLETCHER, N. C. — Truman Miller, WPA airport supervisor for North Carolina, has approved expenditure of $100,000 for airport here.

WADE FOREST, N. C.—Town receives bids Dec. 28 for extension of waterworks system, including the furnishing and erecting of a 300,000-gallon elevated tank and tower, 350 tons of cast iron water pipe and specials, filter and extensions to present building for machinery and tank. William M. Piatt, Durham, N. C., is engineer.

South Carolina

MARION, S. C.—F. F. Watson, representative of Watson & Watson, Knoxville, Tenn., has acquired the cotton mill of Marion Mfg. Co.

Tennessee

CHATTANOOGA, TENN. — Llena Mills Inc., Providence building, plans erecting a warehouse in North Chattanooga.

CHATTANOOGA, TENN. — Chattanooga Steels Inc., E. H. Cairns president, proposes to occupy building formerly used by Street Brothers Machine Co.

MEMPHIS, TENN. — Southern Shellac Mfg. Co., 556 Suzelle street, plans $10,000 enlargement to plant and erection of a warehouse.

MEMPHIS, TENN. — Nabors Trailer Co., Mansfield, La., has acquired a building at 206 South Pauline street, and will remodel.

West Virginia

WHEELING, W. VA.—Continental Can Co., main office, New York, will enlarge South Warwood plant, foot of North Seventh street, at a cost of $44,000.

WHEELING, W. VA.—Hanna Coal Co., Cleveland, plans improvements to its Willow Grove mine, including the erection of a steel tipple having a ca-

(*Please turn to page* 78)

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(*Concluded from page 76*)

pacity of 400 tons, and an ashing and drying plant.

Virginia

SALEM, VA.—J. J. Cassidy town manager, wants water meters, centrifugal pumps, gate valves, cast iron boxes, cast iron water meter boxes, and cast iron pipe.

VIRGINIA—Two projects here for the veteran's administration have been approved by the President: A 500-bed hospital at the Hampton, Va., veteran's home, costing approximately $750,000; 492 beds for neuropsychiatric patients at new hospital between Roanoke and Salem, Va., costing approximately $900,000.

Missouri

FULTON, MO.—Ieland Engineering Co., St. Louis, is preparing plans for natural gas distribution plant and supervision of construction. Work will start Jan. 1 and cost is $50,000.

GALENA, MO.—City, George J. Tuttle mayor, will soon call for bids for $35,000 waterworks, including deep well, centrifugal, automatic type pump, and a 65,000-gallon tower to be erected on ridge west of Galena. Project includes distribution system with 100 outlets.

GREENFIELD, MO. — E. W. Nagel, Dade County Mining Co. Inc. wants the following items for a zinc mining development: Diesel engines, pumps, crushers, rolls, screens, jigs, tables, cars, and accessories.

LIBERTY, MO.—Citizens of public water supply district No. 1 of Clay county will probably vote first week in January on bond issue for waterworks system.

SPRINGFIELD, MO.—Dade County Mining Co. Inc., E. W. Nagel president, has purchased 125-ton capacity concentration mill 10 miles northeast of Greenfield, Mo., leased 332 acres, and is sinking shafts, in a development program.

ST. JAMES, MO.—St. James Distillery Co. has been incorporated by E. A. Maynor and Felix Garnier.

ST. LOUIS—Celucoating Co. has proposed to establish a plant for coating printed matter. Thomas Law and Alan A. Jackson are executives.

ST. LOUIS—Carondelet Brewing Co., 2025 Gravois avenue, has acquired the old Phoenix brewery at 217 South Eighteenth street, will install new equipment, and rehabilitate plant, at an expenditure of $150,000.

ST. LOUIS—The Bondall Co. has acquired a 2-story factory building at 500 Bittner street, and will expend $15,000 for alterations and $40,000 for machinery, to be used for the manufacture of brake linings, clutch facings, and other products. Charles A. Niemeyer is president.

Arkansas

LITTLE ROCK, ARK.—City, Mayor Overman, submitted an offer of $3,000,000 to Arkansas Water Co. for proposed waterworks plant and distribution system. J. F. Loughborough is company's attorney.

PINE BLUFF, ARK. — United States engineer, Vicksburg, Miss., will soon take bids for the construction of a concrete-steel sheet pile levee wall with appurtenant works and accessories.

Oklahoma

OKLAHOMA CITY, OKLA. — City, Herbert Howell airport engineer, will construct hangar for army aircraft at municipal air terminal, at a cost of $135,000. Moss Patterson is regional airport improvement director.

Texas

DALLAS, TEX.—Charles A. Zilker, San Antonio, Tex., has a site on the southeast corner of Orange and Cochran streets, for erection of a $145,000 brewery. He may add a whiskey distillery. Plans are being prepared.

FORT STOCKTON, TEX. — Houser Machine & Supply Corp. has been organized and incorporated by J. E. Houser and Hart Johnson.

HOUSTON, TEX. — Houston Armature Works, No. 4 Preston avenue, was severely damaged by fire recently.

HOUSTON, TEX. — Port commission, Joseph W. Evans chairman of board, will construct a bulk handling plant at Manchester dock, at a cost of $10,000. Work is to start soon.

HOUSTON, TEX. — Western Electrical Service, 105 Maury street, has acquired a site on 6300 block of Navigation boulevard, and will erect a plant, 48 x 70 feet, at a cost of $12,000.

HOUSTON TEX. — Cook Heat Treating Co., Los Angeles, will occupy the building to be erected in the 6200 block of Navigation boulevard by Mrs. Nels Esperson. Bids are now being received and work will start in two weeks. The building will be steel frame, fireproof, and will cost $35,000.

IRVING, TEX. — Sam Hill, 2612 Thomas street, Dallas, Tex., is erecting an ice plant.

VICTORIA, TEX. — Barnsdall Pipeline Co., 1546 West Main street, Oklahoma City, Okla., contemplates laying a pipeline from Placedo to Harbor Island, Tex., through Refugio, Victoria, Calhoun, and Aransas counties, a distance of 50 miles.

Wisconsin

CEDARBURG, WIS. — E & W Mfg. Co. plant here has been leased on long term by Orth Mfg. Co., 3025 West Atkinson avenue, Milwaukee, maker of hub caps and other automobile stampings and parts, and the transfer of shop is under way. A. V. Orth is president.

MILWAUKEE — Robinson Plating Works, 820 West Winnebago street, was damaged by fire recently. A. W. Ruttan is owner.

Minnesota

MINNEAPOLIS — Minneapolis-Moline Power Implement Co. plans immediate restoration of tractor assembly shop, damaged recently by explosion and fire.

MINNEAPOLIS — Western Alloyed Steel Casting Co. has been incorporated to manufacture electric alloyed steel castings, by Edwin F. Junger, Charles C. Hess, and William C. Green. The new corporation is the successor to the old Western Crucible Steel Casting Co.

MINNEAPOLIS—Penn-O-Tex Oil Co., Frank M. Starling president, plans construction of a factory at Twenty-fourth street and Hiawatha avenue, to house an oil compounding plant. Larsen & McLaren, Roanoke building, are architects.

South Dakota

BELLE FOURCHE, S. DAK. — Wyoming-Montana Bentonite Co. has been incorporated to engage in mining and milling bentonite in Crook county, Wyoming, by William I. Smith, Thomas McClanahan, and Robert C. Hayes.

KEYSTONE, S. DAK. — American Rushmore Mining Co., Rapid City, S. Dak., J. W. Sharp manager, will soon start construction of the first unit of a 1000-ton ore mill here, to cost about $100,000.

Iowa

MARSHALLTOWN, IOWA—Roberts & Oake, packers, H. A. Maines president, Chicago, will soon start construction of a new boiler house for packing plant, to cost $50,000. New boilers will be installed. W. H. McCormac is local manager.

Pacific Coast

SAN FRANCISCO — Pacific Steel Foundry, Eighteenth and Treat streets, was damaged by fire to the extent of $50,000 recently.

LOS ANGELES — National Venetian Blind Co. is occupying its new location at Alhambra road and Sichel street, with six times the floor area of the former plant. Expanding operations are under way. W. E. Lindblom is president.

LOS ANGELES — Bids are asked for Jan. 14 by metropolitan water district, E. E. Weymouth engineer, 306 West Third street, for construction of Iron mountain pumping plant, outlet structures, electric switching stations, etc. 15 miles west of Rice, Calif. in San Bernardino county. Estimated cost is $500,000.

SEATTLE — Rex Metal Works, 117 Spokane street, sustained plant loss by fire, recently.

SEATTLE — Gold Crown Mines Inc., 2553 Second avenue west, has been organized by B. O. Erickson and associates.

OLYMPIA, WASH.—Spear & Jackson Inc. has been incorporated to deal in the manufacture and construction of machinery and appliances of every kind, by Scott Z. Henderson, Frank M. Carnahan, and L. Thompson.

UNION GAP, WASH. — Bids have been rejected for pumping equipment and new tenders are invited for Dec. 27.

Dominion of Canada

KIRKLAND LAKE, ONT. — Macassa Mines Ltd. is said to be considering plans for a 200-ton addition to its milling plant.

ORILLIA, ONT. — Fahralloy Canada Ltd., subsidiary of Ventures Ltd., Canadian bank of commerce building, Toronto, Ont., is establishing a plant here for the manufacture of high chrome nickel steel alloys by electric furnace process.

WINDSOR, ONT. — L. A. Young Industries of Canada announces a rearrangement of their manufacturing activities here, concentrating on the exclusive manufacture of automobile cushion springs and parts, with enlarged quarters and a bigger staff. The Canadian head office will remain in Windsor with C. P. Platt in charge.

ROUYN, QUE. — Austin Rouyn Gold Mines, 21 King street east, Toronto, Ont., may install a mill unit at its mine next spring. M. B. R. Gordon is president.

Foreign

LONDON, ENGLAND — Waterlow & Co. Ltd. is having plans drawn up by F. E. Simpkins for the construction of a new foundry works.